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Submarine Cutting Torch Under Water

Broken Siphon Pipe Burned Off by Electric Torch Under
50 Ft. of Water—Great Advance in the Art of
Submerged Metal Cutting

BY ROBERT G. SKERRETT

AS the oxy-acetylene flame is capable of fusing its way through metallic masses of all sorts and divers thicknesses, whenever it can be brought into play in capable hands, it is not surprising that much experimenting has been done in the last decade to adapt the torch to the needs of the marine worker. This flame has been utilized extensively in cutting out the rivets of steel hulls, so as to hasten repair jobs and replacements; but as a rule this procedure has been confined to ships in dry dock or to parts of vessels that could be approached in the open air. It has long been realized that much could be gained if a torch capable of working under water could be devised, for service in cutting metal bodies of one kind or another. To this end, the Germans brought out some years back a submarine oxy-acetylene torch.

Broadly stated, the gases were discharged through a cup-shaped nozzle, and the flame was generated at the inner center of this vessel. The pressure of the expanding gases was relied upon to prevent the enveloping water from flooding the nozzle. Further, the force of the gas blast also served to wipe away or to scatter the metal made fluid by the heat of the flame. If the position of the nozzle opening or the impulse of the stream of gas was such that the water could inundate the cup, then the flame was extinguished and it was necessary to carry the torch to the surface to relight it.

In using this torch, care had to be exercised to hold the nozzle downward—at least not to raise its mouth above the horizontal. And the flame could not be kept alive unless the pressure of the repelling gases considerably overbalanced the hydrostatic pressure at the operating depth. In short, this submarine-cutting apparatus was found effective only at comparatively shallow depths. Nevertheless, the Germans pointed the way and proved that a bare flame could be kept burn-

ing when submerged. This much was clear gain.

The question is often asked: "Why try to cut metals with a flame under water when there are already available pneumatically-driven tools that can be utilized for such work?" And the query is a logical one, as compressed air must be used for the divers. Air-actuated tools have been built for service of this sort, but they are not commonly employed, for one reason or another. Mechanisms of this character are apt to clog with ice, owing to the refrigerating action of the rapidly expanding exhaust air, and this chilling is speeded up when the temperature of the water is already low. Therefore, the idea of a submarine torch has appealed to the inventive mind.

During 1918 and 1919 the French naval authorities became much interested in efforts made at Lorient to improve upon the earlier German torch, and to devise comparatively simple attachments by which the ordinary oxy-acetylene torch might be operated under water in dealing with marine salvage problems, of which there were then many. After months of experimenting a measure of success was attained, and steelwork—parts of wrecked vessels—was so dealt with. That is to say, angles, T-bars, deck beams, etc., were thus cut through in a fairly rapid manner at depths ranging from 10 to 30 ft.

The nozzle finally evolved for the work was a double-walled affair, the inner tube constituting the flame chamber. From between this tube and the outer sleeve was discharged a stream of compressed air at sufficient pressure to form an atmospheric envelope for the flame. The force of this air held the water at bay while the torch reached the metal so bared.

While theoretically simple, the French torch was, in fact, complex, because it had to be supplied with acetylene, comparatively pure oxygen and air, each at a different pressure. At a depth of 30 ft., the pressure of



Hoisting from the Water the Broken Section of
Pipe with—at Top—the Bell Cut from the Next
Section

the acetylene was about 23 lb. per sq. in., while that of the oxygen and the air was much higher. The purpose in keeping the pressure of the acetylene as low as possible was to check its tendency to explode rather than to burn as a flame. Indeed, this characteristic of acetylene has limited its subaqueous use; and, inasmuch as the pressure of the gas must be augmented as the depth increases, the operation of such a torch has been confined to submergences of less than 40 ft.

While the French found that their torch was apt to

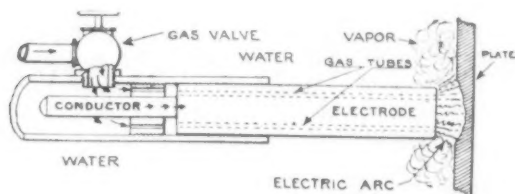


Diagram of the American Torch

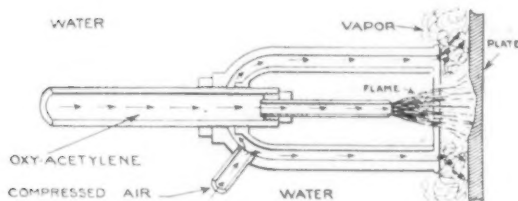


Diagram of the French Torch

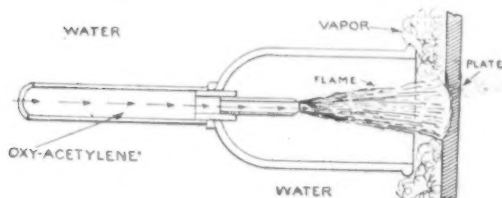


Diagram of the German Torch

be extinguished if the nozzle touched the metal surface, yet the tip of the apparatus had to be held from it a distance of but a few millimeters. It has latterly been reported that they have improved upon the apparatus, so that it can be ignited under water by chemical action; this obviates necessity for the diver to return to the surface to relight the gases. But there is nothing to indicate that this torch has yet gone beyond the experimental stage.

American Progress in Submerged Cutting

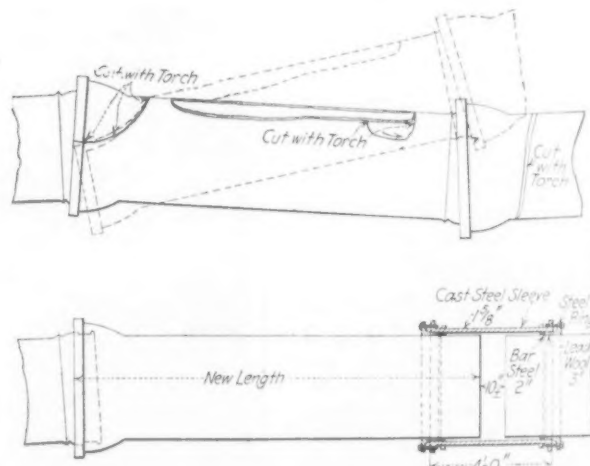
The foregoing résumé of the art will help to a better understanding of what has been achieved here during the last few years. These steps forward have placed our engineers in a position to attack successfully certain difficult tasks under water; and the recent repair of the ruptured water main beneath the Narrows in New York harbor represents a climacteric performance. Staten Island, by reason of the break, was cut off from the Catskill water supply system for several weeks, and this period of isolation would, undoubtedly, have been a good deal longer but for the aid rendered by submarine cutting torches in facilitating the removal of the damaged piping.

These torches are the outcome of experiments begun in 1918, during the refloating of the transatlantic liner *St. Paul*, which sank at her slip. For the purpose of draining that craft the divers blasted passages through various bulkheads. These holes allowed the water within the ship to move freely from one compartment to another so as to reach the suctions of wrecking pumps. But the salvors realized that this time-honored method of breaching steel partitions always did a good deal of damage and entailed correspondingly heavy outlays in making repairs.

Therefore Ralph E. Chapman, one of the engineering force of the wreckers, and J. W. Kirk, an associate, set about adapting the oxy-acetylene torch and the electric arc for subaqueous service. The improvements evolved by them did much to insure a more nearly continuous working of the cutting flame; and by means of this apparatus 12 holes, each about 14 in. in diameter, were made through as many steel barriers. It took several hours to cut the average opening; some of the passages were located in decidedly awkward places; and the deepest of them were 50 ft. under water. The torch was lighted below the surface electrically, both at the outset and whenever the flame was extinguished accidentally. However, experience revealed that the acetylene was troublesome at the lower depths, and for the reason already explained.

This introduction of the electrical feature marked an advance in the art; and between 1918 and 1921 the **Merritt & Chapman Derrick & Wrecking Co.**, recognizing the desirability of such a tool for dealing with wrought iron and steel under water, gave Ralph E. Chapman a free hand in the further development of the torch. Last December, in its new form, the torch was put to a convincing test during the raising of the United States submarine *S-48*, which sank off Bridgeport, Conn.

To refloat that boat, it was necessary to drain the flooded afterbody; and the primary problem was to get divers into the vessel to make a pipe connection so that wrecking pumps could be brought into action. The logical way to do this was through a hatch immediately over the inundated motor-room, but that hatch—at a depth of 70 ft.—was sealed tight by a cast-steel cover locked in position from within the submarine. A hole

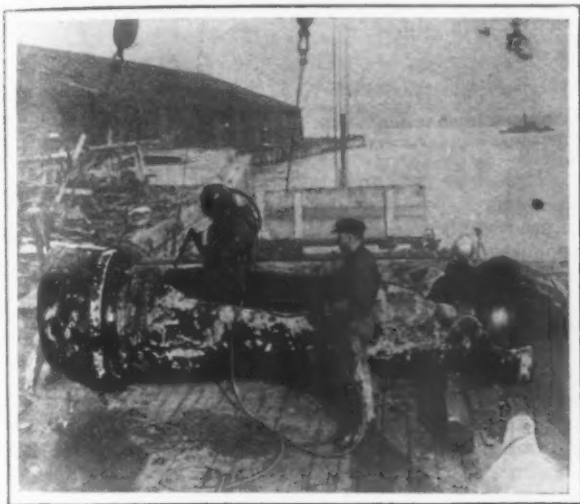


How the Old Pipe Section Was Cut Out and Lifted: How the New Section Was Inserted and Made Tight

was cut through the center of the heavy steel hatch cover by the new torch; and when this was large enough a diver reached in and released the locking gear.

The torch used on the submarine was simple in its get-up. Its operative parts, at the working end, consisted of a carbon electrode, a few inches long, traversed longitudinally by two small gas conduits—brass tubing about $\frac{1}{8}$ in. in external diameter. The pressure and the quantity of gas conform with the operating depth. All the diver has to do is to bring his tool close enough to the metal to be cut to cause arcing; and the best effect is obtained when the electrode is something like $\frac{1}{4}$ in. away from the "ground." The electrode is connected to one pole of a generator, the other pole being grounded through the water to the work. Acetylene is not employed. The "cutting gas," of a nature not disclosed, is supplied from the surface through a suitable hose, within which is carried also the electrical conductor.

The temperature of the oxy-acetylene flame is in the neighborhood of 3600 deg. Fahr., while that of the electric arc is more than 6000 deg. The function of the gas used is to create a gaseous envelope for the arc, by converting the surrounding water into steam, and to oxidize and blow away the metal that is fused by the arc. Without this action of the gas, the fused metal would be apt to "freeze" quickly with the shifting of the electrode, and thus slow up the speed of cutting. The new torch is not hampered by hydrostatic pressure so long as the "cutting gas" has sufficient heat to vaporize the water, and force enough to blow the melted



Illustrating the Method of Cutting from Outside the Pipe; the Lower Third of the Bell, at Left, Had to Be Cut from Inside the Pipe, the Diver Lying on His Side to Operate the Torch

metal aside. A carbon electrode will last for 30 minutes of cutting.

The torch lately used on the Narrows siphon was much like that employed in cutting through the hatch of the S-48, save that it had to be modified slightly so that it could deal with thick cast iron. The remelting temperature of cast iron is around 2800 deg. Fahr.; and the higher the fusing point the faster a metal freezes, especially when acted upon by cold water. The problem, therefore, was to utilize as much of the heat of the electric arc as practicable in melting the cast iron, and then to scour out the molten crater by a suitably strong blast of "cutting gas." At the time the work was undertaken in February there was ice in the harbor, and the temperature of the water was close to 32 deg. Fahr.

Cutting of metal walls ranging in thickness from 1½ in. to 3½ in. was involved, the thinner body being severed at a linear speed of from 4 to 6 in. an hour, depending upon the ease with which the divers could get at their points of attack. All told, the divers made cuts aggregating nearly 30 ft. in length; and they were engaged on this phase of the task for the better part of ten days. One portion of the work involved cleaving circumferentially a section of the cast-iron pipe having an external diameter of 39 in.; this cut was made on a slant to facilitate lifting out the detached portion. The lower third of this cutting had to be done from within the conduit.

What Made the Job Necessary

Where the siphon nears the bulkhead line of the Staten Island piers, it rests 53 ft. below the surface of the water and is buried under 26 ft. of mud. By chance a dredge, engaged in deepening the overlying slip, hit one of the 12-ft. pipe lengths a shattering blow; the impact opened up a wide and long fracture. This necessitated shutting the gate valves at the Brooklyn and the Staten Island ends of the main. The ques-

tion was, how to withdraw the damaged unit and to insert a new one in the shortest possible time, and with the least disturbance of the neighboring links? The Merritt & Chapman Derrick & Wrecking Co., which had laid the siphon, tackled the job.

First, a wide excavation was made in the harbor bed for the purpose of baring the injured pipe, and to give the divers a chance to work without fear of the mud sliding in on them. The blow that had fractured one pipe unit also forced the two contiguous ones downward out of line; and before any cutting was done the divers blocked these up. Next, the fracture was enlarged near the spigot end (right end, in our drawing) to form a hatchway through which a diver could get inside to cut the lower part of the adjoining pipe just back of the bell. Most of the upper section of the bell of the ruptured pipe length was then detached by cutting, including an enveloping wrought iron band 4 in. wide and 1½ in. thick. This work produced an elbow-like hollow which allowed sufficient play, when the opposite end was lifted, as shown in dotted lines, to break that lead-packed joint and to let the remaining part of the bell swing outward and free.

A new section was promptly lowered and installed in place of the fractured one, the joint at the bell being sealed with a packing of lead wool hammered home. The gap between the spigot end of the new unit and the pipe from which the bell had to be severed was bridged by a cast steel sleeve of ample length (5 ft.) to provide a strong union. The manner of making this connection is shown in the sketch. The bolts shown were used merely to equalize the space to be used for lead wool packing.

Before the repaired siphon was permitted to send water onward to Silver Lake reservoir, Staten Island, it was scoured out and sterilized. This was done by turning Catskill water into the siphon at Brooklyn and discharging it into a sewer at the Staten Island side by way of a 12-in. blow-off. When all of the mud and foul water were thus purged from the conduit, chloride of lime was added to the water entering at Brooklyn.



This Portion of the Bell of the Broken Pipe Section Was Cut Off to Permit Easy Separation of the Broken Unit from the Next Intact Section

This protective measure continued until tests showed the siphon to be absolutely clean. These steps were essential, for normally this siphon supplies some 125,000 people daily with the bulk of their potable water.

The Commonwealth Steel Company, St. Louis, is paying its molders 76c. an hour and not 90c., as recently stated in these columns.

Novel Applications for Thin Steel Bands

Special Advantages Follow Their Use for Power Transmitting and Conveying Purposes—Question of Tension Important

BY BERNARD KRUGER*

WHILE the entering of metal bands into competition with ropes, leather and textile belts for the transmitting of power and the mechanical handling of material, has made great headway during the past few years in Europe, very little concerning this development has appeared in the literature of this country. At present there is almost 1,000,000 hp. being transmitted by steel bands, covering every class of drive, and over 1000 steel band conveyors are at work, handling not only ordinary materials, but including some hitherto impossible for any kind of belt conveyor.

Successful use of steel bands for power and conveying has been gradually evolved from experiments made during a period of nearly fifteen years in most countries where mechanical power is used. The early experimental attempts were directed to the use of steel bands for power transmitting, but after a short period of use they invariably broke when subjected to any considerable increase in load. Persistent failure also attached itself to the various connections used in joining the ends of the bands together.

Subsequent experiments showed that these unsatisfactory results were attributable mainly to mistaken conceptions as to the conditions under which steel bands should be used. In calculating and constructing metal band gearing, on the occasion of previous experiments, it was found that consideration was not given to the fact that the metal band employed is subjected to a flexure constantly varying from zero to a maximum, and that to insure durability with such a demand it was not sufficient for the bands to be calculated in the usual manner, that is, so that the greatest bending stress which occurred was below the limit of fracture of the material. The error consisted in not regarding the result of philosophical researches first undertaken by Wohler, according to which a tension constantly varying from zero value to a maximum, and frequently applied to a body, causes self-destruction, if the maximum tension is not confined to half the breaking stress of the material.

Avoiding Fractured Bands

The present system is, therefore, based on the knowledge that a fracture of the belt band, even with a constantly varying demand on its flexibility, can be avoided with certainty if the maximum demand likely to occur is kept so low that it does not attain the value of the limit of fracture. According to the present method the breaking of the bands is avoided, and the durability made unlimited by the thickness; that is, the sectional dimension which, when wrapping the pulley, is perpendicular to the pulley surface, is arranged to be not more than a definite maximum.

The bands are made from carefully hardened and tempered carbon steel, prepared by special process, rough rolled at red heat and then brought down to standard thickness and width by cold working. The tensile strength of the finished material is about 95 tons to the sq. in. The edges are rounded and so finely finished that the bands can be safely handled, even when running at high velocity.

The dead weight of the steel band is very small, as compared with its great tensile strength, consequently, power for power, it is far lighter than any leather or woven-belt, than the equivalent power chains or cotton ropes. In the following table are shown the approximate leading dimensions, namely, effective driving

width and weight of leather belt, cotton ropes, power chain and steel band for transmitting 200 hp. at about 3000 ft. per min.

System	Weight Per Ft.	Driving Width
Double leather belt.....	6 lb.	24 in.
Five 2-in. cotton ropes.....	7 lb.	15 in.
Three-inch pitch chain.....	43 lb.	7 in.
Steel band	15 lb.	8 in.

It will be gathered from the preceding figures that the steel band is so light in weight that it would be impracticable to depend upon its sag to give any serious proportion of the driving tension or adhesion to the pulleys.

Owing to the high modulus of elasticity of steel it is necessary to determine the length of a driving band with considerable accuracy; a short extension, compelled by cutting the band too short in the first instance, sets up very serious stresses. To accomplish this determination, an ingenious device has been invented for determining the necessary length for the purpose of obtaining a truly correct working tension. For this purpose it is requisite to make allowance for the sagging of the band, which is effected in this manner:

A measuring band of small breadth and of definite section is mounted on the pulleys on which the operating band will subsequently be required to run, and the ends fitted into a tension frame. By means of a helical spring and calibrated nut, by the compression of which the arms of the tension frame approach one another, the total tension equaling the desired initial unit stress in the driving band is read off on a scale. One of the pulleys around which the band is placed (or also both pulleys, in opposite directions) is now slowly rotated so that the friction of the pulley causes a rise in tension in that branch in which the tensioning apparatus is placed, without, however, the band being driven by the pulley. The tension indicated by the apparatus is noted, the pulley or pulleys are then rotated in the reverse direction, so that the branch under test is now slackened to a certain extent; the tension then indicated by the apparatus is again read, and it is ascertained whether the arithmetical mean of the two tensions which has been read corresponds to the desired fundamental tension. The overlap of the ends of the measuring band is now cut off and, the tension being released, the remaining length is the correct measurement to which the driving band unstrained must be cut.

The Joint

Attention was next devoted to evolving a suitable method of connecting the ends of the bands together. It was discovered essential, for insuring durability, that the joint be provided at its ends with extension surfaces of suitable curvature, from which the steel band would be able to ride off, on transition to the circular path around the pulley from the straight path. This led to the invention of the present joint in which, the clamping plates being shaped to the pulley profile, stresses at the joint are distributed evenly over the whole width, and one of the most prolific causes of fracture in the early installations is thus avoided.

Friction Covering on Pulleys

So that metal does not run to metal, and to prevent any possible slip, a friction coating consisting of a layer of canvas, to which are glued fine sheets of cork, is placed over the pulley rim, and to avoid stripping under variable load, the pulley rim is first serrated by a rough file or chisel nuts. A special cement is available for use in very damp situations.

In a prolonged series of tests, made to show the

*J. G. Wray & Co., engineers, Chicago: late manager and director Steel Belts, Limited, and Steel Conveyors, Limited. The paper was presented before the Western Society of Engineers.

values of the coefficient between a steel band and a covered pulley, it was found that for a useful tension, such as is now considered good practice in steel band driving, the frictional coefficient between steel bands and covered pulleys has practically an equivalent value to that between leather belts and iron pulleys.

Stresses

The permissible bending and tensile stresses for the normal use of steel bands depend on the total amount of the stresses, on the ratio of speed reduction, and on the ratio of the driving distance to the velocity of the bands. The bending stresses caused by running the belt over the pulley depend on the ratio of the band thickness to the pulley diameter. The tensile stresses thus determine the maximum bending stresses and the permissible thickness for the required pulley diameter. Where it is found impossible to obtain a width for a necessary tensile area by means of one band, several individual bands are run alongside each other. So as to allow the maximum power to be transmitted over a pulley of small diameter, it has been found necessary that the breadth of the band should be as large, and the thickness as thin, as possible.

Necessary Conditions

The requirements necessary to the successful employment of steel band transmission are simple, but nevertheless important. The lack of even one of the essentials would lead to unsatisfactory results. On the other hand, given suitable conditions, the results are definite and certain. The shafts, bearings and fixings must be of solid construction, strong enough to transmit the maximum load demanded. The shafts must also be parallel, and the pulleys running true.

Pulley Construction

In steel band transmission it is necessary that the pulley face should be flat. This is due to the fact that if the pulley was crowned, the centers of gravity of the joint clip would be raised slightly from the pulley every time the clip would run on the latter, thus causing a blow to be struck which is greater, the smaller the pulley diameter and the higher the belt speed. The stress caused by this blow would be thrown mainly onto the middle of the band, and this would cause at this point gradual deterioration of the material and ultimate fracture. As the steel band is only one-third the width of an equivalent leather belt, the use of specially narrow and correspondingly stronger pulleys enables considerable saving in weight to be made, particularly in large diameters, at the same time considerably reducing the cost.

Assuming, from a millwright's point of view, that the shafts and bearings are properly proportioned and fixed, and the amount of power to be transmitted being already determined, the necessary calculations are then made for the size and length of the belt to be used. These are based upon carefully worked out formulæ, and as the material is practically static (the maximum and minimum contraction and expansion being only $\frac{1}{8}$ in. to the yard) the tension necessary for any particular power or width is exactly determined. Thus it will be readily understood that, when once the belt has been mounted in the manner previously described, it requires no further adjustment.

Advantages

Assuming that the necessary conditions can be fulfilled, steel band transmission is guaranteed to give the following important advantages:

1. An efficiency in power delivery of 99.995 per cent.
2. Great steadiness; a necessity for electrical machinery, textile purposes, paper mills, etc.
3. Favorable use of space; the distances of pulleys are optional to a great extent, depending on the speed; a perpendicular drive is no disadvantage for steel band driving.
4. Absence of stretching; a steel band does not stretch by use, as has been seen by eight years' experience.
5. Even running, free from slip; as there is no actual measurable slip, it follows that transmission by steel bands is uniform and invariable.
6. Narrower width; a steel band is only about one-third as broad as a corresponding leather belt.
7. Good bearings, owing to the exact calculations of the necessary tension for each particular drive, together with the great reduction in the weight of steel bands, there is a

minimum of strain on the bearings, which consequently run cooler.

8. Cleanliness; no dressings are required.
9. Unwearability; steel driving bands have now been in operation for eight years, and tests made of the belts first fitted show no signs of deterioration.

Steel Bands for Conveying Materials*

In using the steel band in conveying, the same general basic principles are adhered to as for transmission, but other factors developed have also to be taken care of. The steel band conveyor is designed in two ways: With the upper strand supported by rollers, i.e. rolling conveyor; with the upper strand sliding on timber runners, i.e. sliding conveyor. In both cases the lower strand is supported by rollers at intervals of 15 to 30 ft.

With the rolling conveyor, the upper strand of the band is supported by rollers at intervals of 6 to 13 ft., according to the nature of the material conveyed. For materials such as charcoal and coal, a box troughing arrangement can be employed, but in this case the distance between rollers is reduced considerably below that employed for the open belt.

With the sliding conveyor, in many cases, particularly for short conveyors, and for certain classes of material, the upper strand of the steel band can slide on a timber support instead of being carried by rollers. With this type of construction the belt can run:

1. Free without trough.
2. In the bottom of the trough.
3. So that it forms the bottom of a trough narrower than the steel band, and lined with steel plates.

Relative applicability of the rolling and sliding conveyor types depends on the nature of the material conveyed, and on local circumstances. A combination of the two methods can also be employed. The framework is made either of wood or metal. As a general practice, the terminal pulleys are of cast iron of 40 in. diameter. The bearings of the terminal pulleys are designed so as to permit easy adjustment.

The only variations in length of the band to be taken into consideration are those due to changes in temperature. For short conveyors the tension of the band is adjusted by means of movable bearings of the driven terminal pulley. For long conveyors, 130 ft. or more, as well as for conveyors handling warm material, the driven terminal pulley is fitted on a tension frame, supplied with counterweight or steel springs to obtain the necessary stretching force.

The joint of the steel band is made by means of single row riveting, with the rivets countersunk and short overlap. The rivet holes are punched with a special punching tool through both ends of the band at the same time. Due to the rivets being countersunk, they remain firm after the heads have been worn away. The bearings for the supporting rollers are carried on pillow blocks easily movable horizontally, so as to facilitate erection and adjustment.

Running of the Band

True running of the steel band depends mainly upon the accurate location of the end pulleys and supporting rollers. These should be exactly in line with each other, the shafts being at right angles to the direction of motion of the band. As an additional precaution, long conveyors are supplied with flanged idlers at intervals of about 65 ft. on the upper strand, and 100 ft. on the lower strand. With terminal pulleys of 40-in. diameter, the distance between the upper and lower strands at the guide roller is about 2 ft. 6 in.

The material conveyed is fed onto the belt by the usual hopper or chute arrangement, and need not be fed in a longitudinal direction, though this, of course, is always advantageous, in order to get material to rest quickly and quietly on the band. The material is delivered from the band either over the end pulley or by means of delivery scrapers. These are constructed of laminated steel plates, and designed so that they can easily be removed from one point to another. The drive of the steel band generally consists of spur gears. The driving gear can be placed either at the charging or discharging end.

The characteristics of the steel band permit the fol-

*See also page 321, THE IRON AGE, Feb. 2.

lowing advantageous applications of the conveyor, not hitherto possible:

1. If the material conveyed is to be discharged at a point other than the end pulley, the expensive and power-consuming throw-off carriages are replaced by a simple delivery scraper or plow.
2. By means of delivery scrapers of special construction, medium sized material can be discharged at several points at the same time.
3. The material to be conveyed need not, as previously mentioned, necessarily be delivered onto the band in a direction parallel to that in which it is running.
4. Sticky materials such as sugar, clay, etc., can be discharged easily and perfectly and the band kept clean without any difficulty whatever.
5. Sharp-edged and cutting materials, such as broken glass, can be handled satisfactorily.
6. In special cases supporting rollers may be dispensed with and the loaded strand drawn directly over a timber runner, without unduly wearing the steel band. Under the action of the steel the timber runner becomes highly polished, and the power consumption due to friction is then relatively small.
7. Owing to its rigidity in a transverse direction, the steel band has a larger conveying capacity than textile bands. The edges of the band do not bend down even with considerable load obliquely discharged.
8. The supporting rollers can be made narrower than the band, thus permitting, at reasonable cost, the use of large diameters for the idlers, with correspondingly low power consumption.
9. Low elongation permits considerable distances between the idlers, for the loaded as well as for the empty strand of the band, without excessive local sagging.
10. Insensibility to moisture and variation of temperature permit the use of the steel band conveyor in the open air, though in certain cases it is advisable to give the band a coating of tar or oil.
11. Hot material up to a temperature of 212 deg. Fahr. can be handled safely by the steel band.

Steel Mill Wage Cuts in England

Reports show that in the iron and steel trades of England wages have been cut more heavily than in any one of half a dozen other important fields, with the exception of mining and quarrying, and that the iron and steel workers have made a contribution to general liquidation twice as heavy as the average of all the others. Returns for October, 1921, show the average weekly wages, in 103 steel companies having 90,395 employees, to be £3 8s. 2d., compared with £4 18s. 8d. in October, 1920, and £5 8s. in September, 1920. Returns from 126 companies which employed 171,948 persons in June, 1920, show that at the end of November, 1921, employment was only 82,328, or less than 48 per cent of the previous figure.

A survey made by a labor bureau, covering the first eleven months of 1921, showed that the net reduction in weekly wages of 239,500 iron and steel employees amounted to £431,690, or an average per employee per week of £1 16s. 1d. The survey covered more than 5,300,000 other employees in the engineering and shipbuilding, mining and quarrying, textile, transport, public utility and binding and allied trades, with net reductions amounting to a total of more than £4,500,000, or an average of about 17s. per person per week, this being approximately one-half the reduction of the steel workers.

Engineering Foundation has on the press a report of its seventh year of activities in research connected with various branches of engineering. The book will contain also an abridged report of the extensive investigation of the fatigue phenomena of metals, made possible by a large contribution from the foundation. This investigation was conducted at the Engineering Experiment Station of the University of Illinois. Persons desiring to obtain a copy of this report, when issued, should write to the office of Engineering Foundation, Engineering Societies Building, 29 West Thirty-ninth Street, New York.

A summary is being prepared of the data obtained by the Bureau of Standards on the various carbon and alloy steels which have been tested in the metallurgical laboratories of the bureau, including the effects of normalizing rolled-low carbon steel, the effects of 1.25 per cent of manganese, the presence of 5 per cent cobalt, the addition of 0.4 per cent of molybdenum to carbon chromium steel, and the effect of various heat treatments on their properties. Progress has also been made in determining the effect of time-annealing at blue heat on the properties of cold-rolled boiler plate.

EXTENDING FOREIGN TRADE

Operations Under the Webb-Pomerene Act Are Explained

WASHINGTON, March 6.—Pointing out that approximately 50 "associations" operating under the export trade act (Webb-Pomerene law) have recently filed annual reports with the Federal Trade Commission, and a number of new associations are in the process of organization, Dr. William Notz, chief of the export trade division of the commission, in an article in *Commerce Reports* of Feb. 27, explains how the law operates, its advantages and obstacles exporters face. The act is referred to as being among the first of Federal laws looking toward the stabilization of American trade in the after-war period. Its primary purpose, it is stated, was to facilitate the movement of American goods to foreign markets, to serve as an encouragement to exporters and to enable them to compete successfully in foreign markets with buying and selling combinations of other countries. Under the act "associations" may be formed for the sole purpose of engaging in export trade, these associations to be exempt from the Sherman anti-trust law of the United States, and from a certain portion of the Clayton act, with the proviso that there shall be through the association no restraint of trade within the United States, no restraint of the export trade of any domestic competitor, no enhancing or depressing of prices, or substantial lessening of competition within the United States. Further provision is made for the filing of documents and reports with the Federal Trade Commission, to which office is intrusted the administration of the act.

In explaining the different plans of organizations under the act and their operation, Dr. Notz mentions an association of manufacturers whose subscribing firms contract to do all export business through the association. The association makes all contracts with foreign representatives, and export agents receive all orders and apportion them to members. Members deliver and invoice merchandise to the association, which becomes immediately liable for the sale price. The association assumes all responsibility and risk of shipping, insurance, export documents, credit, etc., and as the organization is purely mutual, these expenses and loss (if any) are prorated among members upon the basis of business done with and through the association.

The advantages of co-operation under the act grow more and more apparent, Dr. Notz says, as the details of operation are perfected. Substantial reduction of overhead has been accomplished through joint advertising and selling and the pooling of administrative expense. Exclusive representation abroad is declared to be an important asset formerly not so readily attainable by the smaller export houses. Distribution of orders among several members of an association makes it possible to complete shipments in less time and with more satisfactory results than formerly. Although figures have not been received for the volume of exportation under the act during 1921, the total volume exported by associations in 1920 was estimated at \$221,000,000; and, it is said, it is undoubtedly true that without such combination only a small percentage of that amount could have been shipped by the member concerns represented. Members of these combinations number about 1000 and are scattered throughout 41 States. Many lines are represented, among them iron and steel, foundry, locomotives, lumber, furniture, general merchandise, etc.

"The export business during the past two years has been beset by many obstacles," says Dr. Notz. "Well-established export houses have found operation difficult, and newly organized associations report that it is 'hard to get started.' But there is on every hand a confidence that when the wheels begin to move they will be able to establish and hold foreign markets for American goods. The best indication of this confidence is found in the fact that new companies are in the process of organization, and export problems are being actively met by definite, constructive development of foreign markets."

Laboratory for Malleable Iron Foundry

Equipment for Running Carbon, Sulphur and Manganese
Determinations Facilitates Control of Product—
Getting Rid of Heavy Gases

TO facilitate operation and obtain close control of of the product without necessity for long waits, such as were occasioned when the laboratory work was done in a commercial establishment, the Arcade Malleable Iron Co., Worcester, Mass., has installed in a new building laboratory equipment, which is to be expanded when conditions warrant. Except for a microscope, the present equipment is entirely chemical. It is planned, however, later on, to place physical testing equipment in the basement of the present building, space having been allotted there for the future installation of tensile and (probably) torsion machines. It is the plan to use the tension machine also for transverse tests.

The product of the company consists entirely of malleable castings, which go into a large number of industries. Prominent among the industries served are

those making textile machinery, lawn mowers, revolvers and shotguns, wringers, motorcycles and motor trucks, etc. Large numbers of pipe unions are made, while a considerable business has been built up in the line of radiator nipples and in gears. The product has a tensile strength varying under different conditions from 40,000 to 50,000 lb. per sq. in., accompanied by a ductility represented by an elongation of 12 per cent in 2 in. This compares with the malleable specifications of the American Foundrymen's Association of 45,000 lb. tensile strength and 7½ per cent elongation.

Analyses are made from drillings taken from hard iron bars, cast from the air furnace at time of tapping each heat. The samples are sand-blasted before being drilled, to get rid of extraneous material. Drillings are regarded as far better for this purpose than the usual shot dropped into water, for the latter have to be



Carbon Train, Oxygen Tank,
etc., in Office (Above)
Electric Furnace and Sulphur
Group (Right)
Main Laboratory, Showing
Low Draft for Heavy Gases
(Below)



pounded up or crushed before they can be used, and there is much opportunity for the inclusion of foreign material.

Determination of carbon is made in a Fleming combustion train, which includes a Hoskins electric furnace. This determination can be made in 7 min. The furnace heats the material up to about 2000 deg. Fahr.; while the carbon dioxide separated from the iron at this temperature is caught in the usual manner and determined by weighing, on a Volland & Sons balance.

The sulphur rack, for volumetric determination of sulphur—sulphur by the evolution method—is located in the main laboratory room, while the combustion train is in the office. This sulphur rack is so arranged that it may also be used for igniting precipitates. It includes six Bunsen burners connected on one manifold.

Control of manganese in connection with sulphur is accomplished in the following manner:

The coal pile is staked off in sections and numbered, and each section is analyzed the day before it is used. This plan permits regulating the manganese in the heats according to the sulphur content in the coal. Any section of the pile which shows up fairly high in sulphur is used in the first part of the heat, before the iron has reached the molten state, and when it will not absorb much of the sulphur from the coal. The manganese should be approximately $2\frac{1}{2}$ times the sulphur, in order to absorb from the coal all the sulphur, to form sulphide of manganese, MnS , according to the atomic weights—manganese, 55; sulphur, 32; which produces 87 parts by weight of manganese sulphide for each 32 parts of sulphur.

Thus it can be seen that, if the manganese is much under this ratio, some of the sulphur will not be removed from the iron, and this would cause a composition rim which would make the castings somewhat harder to machine. It would also increase the tensile strength, and slightly decrease the percentage of elongation. Only in extreme cases, however, are these castings so hard and brittle as to be unsuitable for use. Silicon and carbon must also be closely watched, as these two elements have much to do with the physical properties of the iron.

For special work in the study of materials, a small Hoskins electric furnace of rectangular shape has been installed, capable, like the combustion train, of reaching a temperature of 2000 deg. Fahr. This has inside dimensions of $3 \times 4\frac{1}{4} \times 10$ in. Temperature determinations are made by a Hoskins thermo-electric pyrometer,

with a chromel thermo-couple. This may be attached so that it may be used in either room, there being a small sliding window in the wall, as shown in two of our photographs.

An innovation in the bench tops throughout the laboratory lies in the fact that they are made of $\frac{3}{4}$ -in. asbestos boarding, painted with Sherwin Williams acid resisting black paint, instead of the usual slate slabs. The joints are cemented and the cracks filled with a mixture of marble dust and water glass. The combustion hood is lined with the same material. The advantage of this material, aside from its relative cheapness, lies in the fact that it will not stain under any of the acids in use, while slate is not immune from stains.

The hood has not only the customary upper draft into the stack, but also a lower draft. The draft is sufficient to pull out heavy fumes which otherwise would get into the room—such as sulphur and bromine compounds. The hood is arranged so that access may be had from both sides, thus facilitating its use for two or more simultaneous operations.

While the sides of the room are made up of match boarding, as shown, the ceiling is of wall board finished with a non-lead white paint, to avoid discoloration from fumes of hydrogen sulphide. The laboratory has windows on all four sides, each room being thus lighted on three sides. The ceiling lamps are of the nitrogen filled type.

Among the items of equipment is a gas-heated Barnstead still for distilled water, with capacity of one gallon per hour. The sink, together with trap and pipes to the sewer, are of petrified Akron ware, this having great resistance to acids. To accelerate filtering, a suction on the injector principle has a suction pump, with a plunger so arranged that the pump may be cleaned out by the plunger, without dismantling. The Bausch & Lomb microscope is used for examining fractures. It is expected to install later a photo-micrographic instrument in a part of the basement.

Laboratory work consists in examination of raw materials, coals and the product in process of finishing in the air furnaces. There are also a number of special investigations carried on from time to time, and some work is done for outside local concerns, particularly for one plant which is affiliated with the foundry. In connection with the air furnaces, a Leeds & Northrup optical pyrometer is used for temporary determinations.

The building measures 18×32 ft., the office being 11×18 ft. and the main laboratory room 18×21 ft.

MAGNETIC TESTING OF CHAIN*

Apparatus for Determining Depth of Case and Durability of Skid-Chains for Auto Tires

The problem of determining the depth of case in carbonized and case hardened work is one in which the customary non-destructive methods of test are difficult or impossible to apply. In some cases, the surface hardness may be estimated with a scleroscope or a file, or under favorable conditions a Brinell test can be made, but in general, none of these tests is satisfactory on this class of material. A magnetic method which has been applied successfully to a particular product therefore may be of some interest.

The product under discussion is small steel chain in various diameters of wire from 0.192 up to $\frac{3}{8}$ -in., and in short lengths of from 5 to 15 in. It is used as the cross member in automobile tire chains, where it is exposed to the wear of hard roads, and to the shock of pounding over car rails and cobble stones. The result is that if the case is too thin it wears out too fast, and if too thick, it breaks even before the soft chain has worn out. Fortunately, there is an intermediate condition from which reasonable service may be expected.

In order to determine this condition for maximum

service, a test is needed in which any variable which increases the brittleness of the chain will show itself in the direction of increased depth of case. In the present instance, the magnetic property under observation varies with the quenching temperature and the structure of the chain in the desired manner.

The Variables Involved

Resistance to wear and the resistance to shock are in general inversely proportional to each other, and the point of maximum usefulness is highly indeterminate. The final test, the mileage run on the road, is so full of accidental variations, that the average of a large number of records must be considered. This has so far prevented a close study of the effect of small changes in structure. If we consider the depth of case as the only variable, and make the chain from the same wire, carbonize at the same temperature in the same compound for different times, and quench all our chains from the same temperature, we obtain magnetic readings proportional to the depth of case. If then a set of these chains, ranging from thin case to thick are taken off after the first to break has worn through it will be found that the wear is very closely proportional to the magnetic reading. This holds true regardless of the weight of car used or the speed and nature of the road.

When the chains are run until all are broken and the mileage of each is considered, it is found that in general the low reading and the high reading have given about the same result; and somewhere between the two is the longest lived chain. The softer the road,

*A paper presented at the New York Sectional Meeting of the American Society for Steel Treating, March 3. The author, A. V. de Forest, is research engineer American Chain Co., Bridgeport, Conn.

and the lighter the car, and the slower it is driven, the closer will the best chain come to the high reading, or deep case end of the scale. However, this hard end is the more dangerous, for a chain overhard for the use to which it is put may break in a few miles, while the too soft chain will wear out only after a fair length of travel.

The magnetic test, therefore, is used to determine when the chain is unnecessarily soft or dangerously hard. This latter figure is derived entirely from experience, and is only an estimate to meet the worst conditions. It is not yet practical to make chain to suit the temperament of the driver of each car and the paving of the streets he uses, but some day chains may come like tooth brushes, hard, soft and medium, in properly labeled packages.

Major variables involved are the size of chain; the depth of case; the carbon content of the case and its distribution; the composition of the core; the structure of case and core, as determined by the carbonizing temperature and the heat treatment. The effects of each of these factors on the magnetic result have not as yet been too accurately determined. The following points, however, may be of interest. In the carbonized chain, slowly cooled or normalized, the magnetic reading is closely proportional to the depth of case. Here the core is pretty regular in composition and the carbonizing material the same in each instance. When reheated and quenched the magnetic result is higher, the higher the quenching temperature. Furthermore, the magnetic result is higher for a coarse structure as quenched from the pot, than for a finer structure quenched from the same temperature, as is obtained by reheating and re-quenching. So far the magnetic result has given a pretty close idea of the "brittleness" of the chain, whatever that may mean.

If now another variable is brought in, the drawing temperature results are not as good. A draw at 450 deg. Fahr. lowers the magnetic reading more than it affects the life of the chain. At 550 deg. Fahr., the same thing is true. However, in practice, drawing has not so far proved generally advisable so this effect is not a factor in this case.

The Apparatus Described

The magnetic apparatus itself is a simple form of inductance bridge, operating on 60 cycle commercial current. A rather peculiar type of separately excited galvanometer is used as an indicator. A small rheostat and ammeter control the current to operate. In this case about 0.2 amperes at 110 volts are used. Resistance coils control the sensitivity of the instrument, and the deflections can be adjusted to any desired limits. An adjustable resistance is used to balance the galvanometer and is altered to compensate for different sizes of specimen or to change the scale of the instrument. Either deflection or null method can be used. The deflection method is ordinarily sufficiently accurate. The magnetizing coil may be of almost any size. The one in question will operate on 1/16-in. wire, chain formed of 3/8-in. wire, or bar stock up to 1 1/4 in. in diameter. The whole outfit is easily portable and needs no setting up beyond connection to an alternating current lighting circuit.

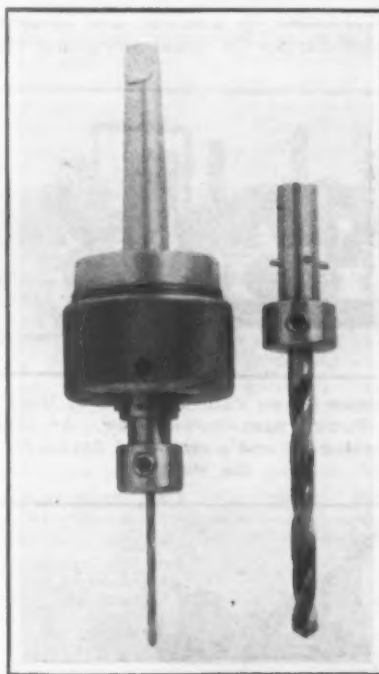
It has been found that the introduction of a rapid and non-destructive test enabled the testing of a vastly greater number of samples, and a much closer control over the factors affecting the problem. It enables experiments to be conducted intelligently on time of heat, temperature, shape and material of pots or retorts, method of packing, arrangement of furnace, carbonizing mediums, and all the troubles giving rise to the far-famed irregularities of case hardened work. Also, by giving quantitative results, it allows a better interpretation of service tests on the finished product.

Last but perhaps most important of all, it affords justice to the heat treating force, for careful and intelligent operation can be accurately appreciated and carelessness properly censured. The result is that much greater interest is taken in the quality and uniformity obtainable under routine conditions, and all concerned with this frequently abused department can share the satisfaction of a good job well done.

New Drill and Tap Chuck

A friction drive, quick-change positive safety drill and tap chuck, having a capacity of 1/8 to 3/8 in. straight shank drills and 1/8 to 3/8 in. taps has been placed on the market by the Save All Tool Co., Waltham, Mass. The new chuck is known as the No. 12 Save All and is shown in the accompanying illustration. It is built along lines suggested in the company's quick-change drill chuck for drills with taper shanks.

The safety device consists of a pin held in place by a pointed screw which positions in a groove in the pin. When the work exceeds the capacity of the tool, the pin shears off and can be re-erected by loosening the screw and inserting a new pin, a feature intended to eliminate



Friction-Drive Quick-Change Positive Safety Drill and Tap Chuck

breaking and burning of drills, taps, reamers, or other tools used in a chuck of this type. The drill or tap is held in a collet which slips into the chuck when the sleeve of the latter is raised.

Will Discuss Trade Associations

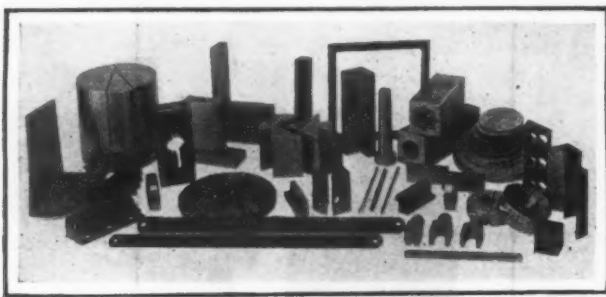
WASHINGTON, March 7.—Correspondence between Secretary of Commerce Hoover and Attorney General Daugherty regarding the legal status of trade association has brought so pointedly to the front the necessity of complete understanding of the functions, methods, and accomplishments of national trade organizations that this subject is to be made an important feature of the convention of the National Association of Manufacturers to be held in New York, May 8, 9 and 10. This will afford an opportunity for the compilation of a volume of authentic information regarding the work of national trade organizations and the association has sent out a questionnaire to its members in order to develop an elaborate study of the work of trade associations. The questionnaire, among other things, asks as to the type and percentage of industries represented, the character of the membership of associations, whether composed of individuals, firms or corporations, etc., purposes and scope and authority of the departments of the trade organizations.

The Chamber of Commerce of Bridgeport, Conn., recently appointed a merchants' committee to make a survey of all available manufacturing floor space in the city, now vacant, with a view to bringing additional industrial concerns to the city. There are several factories and plants, now idle, which were erected during the war and used by wartime factories, and it is the desire of the committee to fill as many of these as possible.

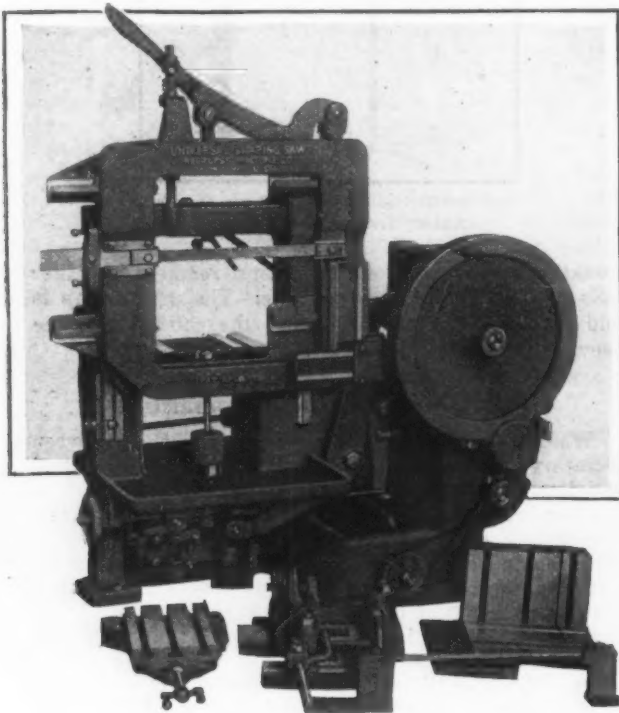
Universal Shaping Saw

Because of added features of design the universal shaping saw shown in the illustration, a recent development of the Peerless Machine Co., Racine, Wis., is adaptable to a much wider range of work than covered by the usual hacksaw machine. Specimens of the work are shown in a separate illustration.

Machine-tool standards of construction are followed in order that the machine may accomplish with a hacksaw blade the various classes of work illustrated. Bearings are liberally proportioned and placed far apart, causing variations to be decreased instead of increased. The saw blade is carried by a four-sided frame, permitting the blade to be placed under proper tension without danger of distorting the bearings. The saw frame is reciprocated by a crank and connecting-rod mechanism, and during the draw or cutting stroke the



Group View Above Shows Various Classes of Work Done on the Universal Shaping Saw, Shown Below. An angle fixture is used for blocking out and a cross-feed fixture for finishing the work



connecting rod is approximately parallel with the line of travel of the blade. This is intended to give a direct pull and permit cutting with the crank angle such that the cutting speed is reduced to a minimum for the cycle of motions, although maximum for the work being handled. During the return stroke the change in angularity of the crank causes the blade to be returned to the starting point at high speed. Three changes of cutting speed are provided.

A feature is the power-feed mechanism provided. At the end of the draw or cutting stroke a cam on the crankshaft actuates a lever which raises the frame on which the saw frame reciprocates. This lifts the blade clear of the work on the non-cutting stroke. After the saw is returned the same cam and lever serves to lower it to the cutting position. At the same time, a second cam on the crank shaft becomes operative and through

a link and lever mechanism, and a ratchet and pawl, a feed worm which meshes with a rack connected to the bearing frame by which the saw frame is carried, is turned in such a way that the worm pulls the rack and the saw frame down.

The repetition of this cycle of movements at the beginning of each cutting stroke of the saw blade provides for feeding the saw into the work at a predetermined rate of speed. Adjustment of this speed is by means of a small hand wheel near the floor at the front of the machine. When the cut has been completed the feed worm is tripped automatically out of engagement with the rack. A spring then lifts the saw frame to the up position and stops the machine. This arrangement makes it unnecessary for operator to watch the progress of the work because he is notified when the cut has been completed by the stopping of the machine.

For angle cutting operations a fixture is furnished on which the work to be cut may be easily clamped to either the horizontal or vertical face. Another fixture adding to the range of the machine is a crossfeed mechanism which is secured to the table of the saw. A piece of work can be secured to this fixture and fed transversely under the reciprocating saw which acts very much the same as a shaper tool and provides for producing a smooth finish on any rough surface that requires the performance of a second operation of this character.

The equipment includes pump, piping and reservoir, which provides cooling solution to the blades. The machine has a capacity for work 6% in. square and takes blades from 10 to 14 in. The speed variations are 132, 85, and 50 strokes per min. The floor space occupied is 24 by 43 in., and the weight, with standard vise, 750 lb.

Complaint of Mitsui & Co. Not Sustained

WASHINGTON, March 7.—Passing upon the complaint of Mitsui & Co., Ltd., exporters of Seattle, Wash., against the Director General, C., B. & Q. Railroad, et al., the Interstate Commerce Commission has handed down a decision holding that the rate of 85c. per 100-lb. charged on 18 carloads of bar iron and steel shipped from Terre Haute, Ind., to Seattle, for export between July 1, and Dec. 31, 1918, was not unreasonable. It also was held that the complainant was not damaged as a result of any undue prejudice that may have existed and the complaint was dismissed. It was maintained by the complainant that the rate was unreasonable to the extent that it exceeded the export rate of 75c. maintained from Chicago.

The commission was asked to require the establishment of the same rate from Terre Haute as from Chicago and grouped points. The decision points out that the Pittsburgh group rate applied from Terre Haute when the shipments moved. The complainant's principal contentions were that the maintenance of the Pittsburgh rate from Terre Haute, more than 400 miles nearer Seattle, resulted in undue prejudice to Terre Haute, and that by reason of its location the latter town was entitled to the Chicago group rate. To support this argument, the complainant relied upon the decision of the commission in the Inland Steel Co. case in which the commission found that the application of the same rate on iron and steel articles in carloads from Chicago, Terre Haute, Vincennes, Ind., and Pittsburgh to the Pacific Coast ports for export was unduly prejudicial to Chicago, Terre Haute, and Vincennes to the extent that the rate from those points exceeded a rate of 6.5c. lower than the rate maintained from Pittsburgh. The Director General of Railroads was the only defendant and as Federal control had terminated no order was issued.

The American Railway Engineering Association will hold its annual convention at the Congress Hotel, Chicago, March 14 to 16, inclusive. At the same time the National Railway Appliances Association will hold an exhibition of railroad supplies and devices at the Coliseum in the same city.

Sectional Meeting of Steel Treaters

Eastern Chapters Hold First Technical Session in New York

—First Public Presentation of Two Important Developments

THE first attempt of the American Society for Steel Treating to hold a sectional meeting was an unqualified success. On March 3 at the McAlpin Hotel, New York, about 200 members from 14 chapters, embraced in the Eastern territory of the society, registered and attended two enthusiastic technical and social meetings in the afternoon and evening. The membership of these chapters approximates 1000.

The object of the directors in planning such meetings was to bring together, four times each year, members of various chapters in localities where a national convention is less likely to be held, as well as to promote the aims of the organization professionally and socially. The meeting held last week fully met these expectations in the presentation of a group of interesting papers, fairly liberally discussed, and in the realization of social and other features, which were impressive. There is the added advantage that at such meetings the national officers and directors can get into more intimate contact with each chapter.

At the afternoon session, which was called to order by George L. Norris, chairman New York chapter, and later turned over to Irving L. Cowdrey, chairman Boston chapter, five papers were presented, all by the authors.

Magnetic Testing of Chain

One of the most interesting of these and one which presented for the first time a new development in magnetic testing was entitled, "The Magnetic Testing of Small Case-Hardened Chain," by A. V. De Forest, metallurgist American Chain Co., Bridgeport, Conn. This is published practically in full elsewhere in this issue. It marks a new application of non-destructive testing and enables a distinction to be made between chain that is properly hardened to insure the best results, as automobile wheels on the average roadway and those that are either too deeply case-hardened and hence brittle, or too little hardened and hence soft.

The author in response to a question as to whether chrome-vanadium alloy steels had been tried for such chain, in view of the fact that the hardening treatment would be simpler, stated that such material had not proved enough better to compensate for the extra cost. Mr. De Forest also stated, in response to questions, that regular 13 per cent manganese alloy steel had not been tried out by his company nor the 1.25 per cent manganese alloy steel. It was the author's opinion, as to the future possibilities of magnetic testing in general, that it would probably be possible to correlate results and perfect apparatus so that at least two properties of steel might be determined by magnetic apparatus. The actual apparatus was exhibited and the testing of chain was demonstrated.

Mass in Heat Treatment

E. J. Janitzky, metallurgist Illinois Steel Co., South Chicago, presented his paper, "New Developments on the Influence of Mass in Heat Treatment," which supplements a paper on the same subject presented at the annual convention in Indianapolis last September. It is abstracted elsewhere in this issue and covers an application of his formula, previously applied to carbon steels, to certain alloy steels. Mr. Janitzky commented on Sir Robert Hadfield's criticism of his first paper, showing to his own satisfaction that the criticisms were unfounded.

New Heat-Resisting Alloy

A new heat-resisting alloy was expounded in a paper by G. R. Brophy, metallurgist research laboratory General Electric Co., Schenectady, N. Y., entitled "Calite—A New Heat-Resisting Alloy." This new

material is an alloy of nickel, chromium, iron and aluminum and is offered as castings for heat-treating equipment. The contained aluminum oxidizes under service, forming a protection coating which is a factor in bestowing certain properties. According to the author:

Calite resists oxidation up to 1300 deg. C. (2372 deg. Fahr.), but 1200 deg. C. (2200 deg. Fahr.) is recommended for indefinite service. The protective oxide formed is tight and does not snap off even on quenching from high temperatures. Quenching after 100 hr. at 1200 deg. C., calite lost but 0.03 gram per sq. cm. exposed, while the best heat resisting base metal alloy other than calite lost 0.56 gram under the same conditions. The same samples were run at 1300 deg. C. for an additional 25 hr. Calite lost 0.0003 gram, the other 0.09 gram per sq. cm. exposed. From these figures it appears that calite is 20 times as resistant at 1200 deg. C. and the only base metal alloy to stand at temperatures higher. At 900 deg. C. or ordinary operating temperatures, the loss per square centimeter was measured in 1/10 mg., or for all practical purposes, no loss.

Calite is practically noncorrosive. Samples have been polished and run in a spray of saturated sea salt solution at 100 deg. Fahr. for 200 hr. and at the end of this time still retained a perfect polish. So-called stainless steel will last but a few hours in this test. For fittings exposed to salt atmosphere calite should be excellent.

Twenty-five per cent sulphuric acid dissolves calite rapidly; hydrochloric acid slowly and nitric hardly at all. Forty-eight hours in 25 per cent nitric acid, the metal lost 0.0004 gram per sq. cm. exposed. Acetic acid has no effect. In general, the physical properties are as follows:

Melting point, deg. Fahr.	2,777
Softening temperature, deg. Fahr.	2,500
Working temperature, deg. Fahr.	2,200-2,370
Specific gravity	7.03
Weight per cu. in., lb.	0.25
Brinell hardness, annealed.	286
Scleroscope hardness, annealed.	40
Thermal conductivity, per cent of pure iron	25
Transverse stress, 1 in. square bar, lb. per sq. in.	4,250
Tensile stress, lb. per sq. in.	36,800

Calite cannot be machined in the cast condition, nor cut with oxy-acetylene. Any change of dimension or finish must be done by grinding. It is more resistant to oxidation at high temperatures and will stand higher temperatures than any base metal alloy tested. Its first cost is low and operating cost lower than other non-oxidizing alloys. Boxes have been run for 1500 heat hours and at the end of that time were still in the best condition. Measurements of these boxes show no warpage or growth. The oxide coating is no heavier now than after the first heat.

Many questions were put to Mr. Brophy during the course of which it developed that this alloy is particularly adapted to the glass industry in that its use does not destroy glass, that it can be poured to a thinness of 3/16 in. and that in oil-fired annealing furnaces boxes made of this alloy act as a baffle, even high sulphur oil having no effect. The author acknowledged that there was much yet to be learned about the new alloy in order to overcome some of its apparent defects and to develop some of its manifest properties.

Cutlery of Stainless Steel

"Stainless Steel in Cutlery Use" was the subject of a paper by R. G. Hall, research engineer R. Wallace & Sons Mfg. Co., Wallingford, Conn. An abstract of this paper will be published in a later issue of THE IRON AGE. The author, however, states that, in studying data on this subject from many sources, "there seems to be a great divergence of opinion as to practically all essential points, including the exact chemical specifications and a very wide range of opinion as to the subsequent handling and heat treatment." As to the analysis Mr. Hall recommends "the carbon content to be between 0.30 and 0.45 per cent and the chromium between 13 and 15 per cent. Doctor Hadfield recom-

mends 13 per cent and the Brearley patents call for chromium between 9 and 16 per cent, while Elwood Haynes has covered in his patents up to 16 per cent." It is the opinion of the author and others that nothing is gained in stainless characteristics or corrosion by exceeding 15 per cent chromium. Phosphorus and sulphur should be below 0.03 per cent, with silicon and manganese about 0.30 and 0.50 per cent respectively.

This paper was read by the author and not pre-printed. It deals with the main features involved in the forging, heat treatment and finishing of this alloy to form knife blades in particular; the tests for stainless qualities are also discussed. In all there are about 40 operations through which these blades pass during their manufacture.

In response to some questions Mr. Hall said that he had no data as to ratio of stainless qualities before and after heat treatment but believed these were better after hardening; that the Crocus finish can be applied to chromium steels despite statements to the contrary; that there is not much difference as to which polishes better, carbon or chromium steels, and that for the stain test, copper sulphate is used and if the steel will stand this test for 2 min., it will stand anything.

Cold Headed Bolts

"Cold Headed Bolts—Their Metallography and Heat Treatment" was the subject of a paper by V. E. Hillman, metallurgist Crompton & Knowles Loom Works, Worcester, Mass., which the author presented in abstract. He said in part:

The term, cold work, implies that energy is expended on the metal when its temperature is below the critical range. The microstructure of the metal prior to the application of cold work consists of an aggregate of crystalline grains or cells, each grain being a structural unit. It may suffer rupture or deformation; it may be enlarged, elongated, stressed or restored to its normal size and shape. When the metal is subjected to mechanical pressure, the crystals are crushed and intimately mixed. Cold work has an embrittling effect upon the metal and the grains, which were originally equiaxed, are elongated, assuming a ropy appearance resembling fibre. In brief the grains lose their original identity.

Conclusions: Various degrees of distortion may be found in the same bolt. Certain regions undergo slight deformation, whereas other sections undergo extreme distortion.

Annealing at 1150 deg. Fahr. will remove the weakening effects of cold work.

Irrespective of the degree of cold work, crystallization will not take place below 1280 or above 1380 deg. Fahr.

If the temperature of the furnace reaches the hazardous zone, 1280 to 1380 deg. Fahr., however, crystallization will take place only in those areas which have been slightly strained.

Annealing above the critical range, 1650 deg. Fahr., is preferable.

In this range of temperature 1625 to 1675 deg. Fahr., and regardless of the degree of strain, crystallization will not result.

In the discussion which followed emphasis was placed on the importance of grain growth as a factor and exceptions were taken to some of the author's statements.

Doctor Mathews Made an Honorary Member

The evening session was one that will be remembered for some time by those present. Besides the delivery of an illustrated paper on "Perfecting a Drop Forging" by J. H. G. Williams, assistant works manager Billings & Spencer Co., Hartford, which outlined some difficulties in making a certain product, and an illustrated lecture by B. H. De Long, metallurgist Carpenter Steel Co., Reading, Pa., descriptive of the company's various equipment for making high grade tool steels by the open-hearth, electric and crucible processes, there were two features of marked interest.

Early in the session the meeting was temporarily turned over by the chairman, A. W. F. Green, chairman Philadelphia chapter, to the national president, F. P. Gilligan, secretary-treasurer, Henry Souther Engineering Co., Hartford, who presented to Dr. John A. Mathews, president Crucible Steel Co. of America, and a member of the New York chapter, an engraved certificate of honorary membership, in which was ex-

pressed a brief appreciation of Doctor Mathews' work in the manufacture and heat treatment of alloy steels as well as of his pioneer work in electric steel. The certificate was graciously accepted by Doctor Mathews in a brief speech.

Colonel White Honored

The surprise of the evening was introduced by W. H. Eisenman, national secretary, Cleveland, who was given temporary charge of the meeting after the presentation of the paper by J. H. G. Williams. Mr. Eisenman reviewed briefly the developments which led up to the amalgamation of the two heat-treating societies in 1920 into the present organization, of the untiring efforts of Col. A. E. White, the first president of the amalgamated society, to whom should be given the major credit for the carrying on of the difficult negotiations. Calling Colonel White to his side, Mr. Eisenman presented a large mahogany chest of sterling silverware to Mr. White as a token of the entire organization's appreciation of the services he had rendered, indicating that the ware was sterling because of the sterling character and sterling zeal in work of the recipient.

Colonel White, completely taken by surprise, said in accepting it that he felt there were many others engaged in that work more deserving than he and then recounted that, while in the service at Washington, he had advocated 100 per cent heat treatment of shells but had been unsuccessful because of the conviction of others in power that there were not enough men, skilled in heat treatment, to carry such a program through. Colonel White said he knew the situation to be such in Cleveland, Detroit and Chicago, that there were enough such men there, but he did not know how it was in the East, though he believed this to be true also. After leaving the service and knowing that there were two heat-treating technical organizations, he became convinced there should be but one and so worked to that end, ably seconded by the untiring aid of the secretary and others.

The Dinner and Next Meeting

A social feature of the day was the informal dinner at the Yates Hotel where over 100 gathered. The menus were unique in that each course was expressed in language embodying heat treatment adjectives such as water-quenched celery, oil-tempered olives, case-hardened tenderloin beef, sorbitic peas, over-heated potatoes, etc.

The next sectional meeting will be held in Pittsburgh, May 25 and 26, under the auspices of the Pittsburgh chapter. All papers are to be presented by Pittsburgh men and the extra day will be largely taken up with visits to steel plants. If other chapters are as successful as the New York chapter in handling the first meeting of this character, then subsequent sectional meetings will be a regular feature.

The Interstate Commerce Commission has set April 6, as the date for a hearing in connection with an investigation regarding power brakes and appliances for operating power brake systems on railroads. It is the purpose to determine whether and to what extent power brakes and appliances now generally in use upon the locomotives and cars are adequate. It also is intended to determine what improved appliances are available for use and what improvements may or should be made.

It has been pointed out that a busy blooming screw-down motor, which raises and lowers the top roll of a blooming mill, is sometimes called upon to reverse as many as 22,000 times in 24 hr. This works out at more than 15 times per minute throughout the entire period, and makes it clear that the necessity for starting and stopping very quickly is a paramount consideration in its design and operation.

Lewis R. Sackett, Samuel A. Stape and John B. Hall, all of Columbia, Pa., have formed the S. and S. Mfg. Co. capitalized at \$10,000, to manufacture steel castings.

Roberts Oven Coke in Blast Furnace Use

Analysis of Results Obtained in Practice—Low Fuel Consumption Despite High Ash Content of Coal

BY M. W. DITTO

SUPPLEMENTING the illustrated description, on page 580, THE IRON AGE, March 2, of the Roberts coke ovens in use at the Granite City (Ill.) plant of the St. Louis Coke & Chemical Co., the following, from a report by Charles R. Holzworth, general superintendent of the company, has many points of interest:

The preceding calculations were made as follows, assuming that the solution losses in all cases are relative:

Case No. 1—No. 6 Furnace (South Works)

1890 lb. coke per ton of pig, containing 4 per cent carbon.

Analysis of Coke		Slag	
Ash	11.0 per cent	Ratio	$\frac{\text{Slag}}{\text{Stone}} = 1.25$
Moisture	2.5 per cent	Carbon required to melt slag	
Vol. matter	1.0 per cent	at 4 lb. slag per 1 lb. car-	
Fixed carbon	85.5 per cent	bon,	$\frac{814}{4} = 204 \text{ lb.}$
Carbon in coke,	1616 lb.	Carbon in pig,	90 lb.
Stone,	611 lb.		
Slag,	814 lb.		

The remaining carbon used to smelt pig iron is 1616 lb. — (204 + 90) = 1322 lb. One lb. carbon was used to smelt — = 1.69 lb. pig.
1322

Case No. 2—Frances Furnace (Using Roberts Oven Coke)

1875 lb. coke per ton of pig, containing 4 per cent carbon.

Analysis of Coke		Slag	
Ash	13.0 per cent	Ratio	$\frac{\text{Slag}}{\text{Stone}} = 1.25$
Moisture	2.5 per cent	Carbon required to melt slag	
Vol. matter	1.0 per cent	at 4 lb. slag per 1 lb. car-	
Fixed carbon	83.5 per cent	bon,	$\frac{1401}{4} = 350 \text{ lb.}$
Carbon in coke,	1567 lb.	Carbon in pig,	90 lb.
Stone,	1121 lb.		
Slag,	1401 lb.		

The remaining carbon used to smelt pig iron is 1567 — (350 + 90) = 1127 lb. One pound carbon was used to smelt — = 1.95 lb. pig.
1127

Case No. 3—Frances Furnace

(Assuming 11 per cent ash in coke and 611 lb. stone.)

Analysis of Coke		814 lb. slag will require	
Ash	11.0 per cent	= 204 lb. carbon.	4
Moisture	2.5 per cent	4 per cent carbon in iron will	
Vol. matter	1.0 per cent	require 90 lb. carbon.	
Fixed carbon	85.5 per cent	2240 lb. pig will require car-	
611 lb. stone.		bon equivalent to Case No.	
Slag		2240	
Ratio, $\frac{\text{Slag}}{\text{Stone}}$	$= 1.25 = 814$	2 or $\frac{2240}{1.95} = 1149 \text{ lb.}$	
lb. slag.			

Therefore, carbon required is 1149 lb. plus 204 lb. plus 90 lb. equals 1443 lb. per ton pig. Coke required 1443
— = 1688 lb. per ton pig.
0.855

Production

The amount of carbon burned at the tuyeres under like conditions, and for the same wind, is constant. The production will then increase in an inverse ratio
1875
to the coke per ton of pig, thus $\frac{1875}{1688} \times 488 \text{ tons (Case No. 2)} = 542 \text{ tons.}$

However, as we have increased the fixed carbon in our coke by 2 per cent, we will slow up the furnace correspondingly, if same wind is blown, by 2 per cent

$\frac{83.5 \text{ per cent fixed carbon}}{100 \text{ per cent}} = 2\frac{1}{4} \text{ per cent. } 542 \text{ tons pig} \times (100 \text{ per cent} - 2\frac{1}{4} \text{ per cent}) = 530 \text{ tons.}$

Our low fuel consumption on a high ash coke and excessive amount of stone per ton of pig is greatly due to the quality of our coke, which burns almost in-

stantaneously to CO at the tuyeres, with the result that a large amount of hearth heat is developed where it belongs, and can be used most economically. With a slower burning coke, the zone of combustion extends higher into the bosh of the furnace, and oftentimes above the mantle. This is noticeable in many furnaces, by the rapid erosion of the lining at this point. With the higher zone of combustion, much of the heat that should be used in the hearth enters the shaft (where already there is plenty, due to the reaction of CO on ore) and is dissipated in the waste gas from the furnace.

With our quality of coke developing a large amount of hearth heat, we carried a 2.30 burden, consisting of 10,000 lb. of coke, 22,000 lb. of ore, 1000 lb. of scrap and 6000 lb. of stone. The ore mixture consisted of 25 per cent Mesabi, 15 per cent Menominee, 40 per cent Marquette and 20 per cent Iron Mountain. The last two—the Marquette and local Iron Mountain—amounting to 60 per cent of the burden, are very refractory, the Iron Mountain especially containing some magnetite, yet our top temperature averaged only 264 deg. Fahr. without water. This is contrary to the general belief that a refractory mixture is always accompanied by high top temperature. As explained above, this is due to the concentrated heat of combustion in the hearth of the furnace, permitting a heavy burden to be carried.

Our flue dust loss was 88 lb. per ton of pig, which, at first thought, might be considered due to the low percentage of Mesabi used, and the comparatively low wind blown, which averaged 34,200 cu. ft. at 60 deg. Fahr. after all time lost on stops and checks was deducted. While this is partly responsible, yet in a larger way the concentrated zone of fusion confined entirely in a well-designed low bosh is more responsible.

Hanging, slipping and other irregularities of operation, that produce most of the flue dust made, are almost unknown to us, because our zone of fusion is in the bosh of the furnace, rather than extending into the shaft, as in many cases, causing the above irregularities.

In connection with this, it is evident, from the attached sheet, that increased wind did not increase the flue dust loss materially, as one would expect when the wind was increased gradually from 31,025 cu. ft. on the first of the month, to 37,850 cu. ft. by the last of the month, in bringing the furnace up to capacity.

Further evidence of good economy of fuel consumption is conclusive in the analysis of the top or waste gas, which showed:

CO ₂	14.1 per cent
CO	24.3 per cent
H ₂	3.2 per cent
CH ₄	.2 per cent
N ₂	58.6 per cent
CO	
Ratio $\frac{\text{CO}}{\text{CO}_2}$	1.72 per cent
B.t.u. value, 92.	

In conclusion, it is well to summarize the important characteristics of our coke, which are conducive to the lowest fuel consumption, even approaching that of charcoal used in the early days of furnacing:

1. Absence of cross fracture, combined with uniformity of size.
2. Uniformity of cell structure.
3. Tough cell structure, permitting a heavy burden.
4. High speed of combustion—approaching that of charcoal.
5. Concentration of heat of combustion in hearth, where it can be used most economically.
6. Low transfer of hearth heat to shaft.

7. Low top temperature—longer contact of ore with reducing gas, which means maximum stack efficiency.
8. Lean waste gas analyses, low thermal loss.
9. Low flue dust loss—more regular settling and lower gas velocity.
10. High pig production with low fuel consumption.

From this report it will be seen that the practice on this type of coke is comparable with blast furnace practice throughout the United States, and it is felt that with more experience a considerably better showing than the above will be made.

The only reason for using the present coals is the fact that, with coal from practically every section of Illinois, it was found that the two coals mentioned run more uniformly in ash and sulphur.

It is difficult as yet to make a comparison of the gas yields from these coals, and the amount possible to recover, as compared to the coking coals, as there has never been an opportunity of running over a long period on a coking coal to find out the relative amount of heat required compared to the Illinois coals. However, in short tests it is found that the coking coals can be pushed at least 2 hr. earlier with the same heat in the coke oven chamber than the Illinois coals, and, based upon present practice, everything indicates that the Illinois coal does not submit to the coking process on as economical a use of fuel gas as the coking coals.

No cause for this difference has yet been determined, but it is believed that it is due to the difference in the physical and chemical structures of the two coals. However, it is known that as large surplus gas yields can be obtained from the use of Illinois coal as can be secured from the coking coals.

The plant of the St. Louis Coke & Chemical Co. was designed to discharge its waste gases at 750 deg. Fahr., and the question of heat recovery from the waste gases is a question of areas and weight of brick exposed to waste gas and air. From the practice established it is felt that the recuperator is as efficient as the regenerator, and gives much better operating conditions in the ovens, due to the fact that there is no reversal of the flow of air or gases through them. While there is no prejudice in their favor, it is evident from the operating results obtained in this plant that they will give entire satisfaction.

It is interesting to note that the results obtained with coke made from 100 per cent Illinois coal, so far during the month of February, show that better practice can be obtained than was obtained upon the mixed coal for the month of January, the largest day being 544 tons of iron on 1755 lb. of coke. Another significant thing is that the rich gas from 100 per cent Illinois coal is running 600 B.t.u. and over.

Machine for Filing Edges of Strip Steel

A strip metal filing machine for use in cold rolling mills in filing the edge of strip steel after it has been slit into narrow strips has been brought out by the D & C Engineering Co., Cleveland. It is said to be the first machine of the kind to be placed on the market, although some strip mills are using machines of their own design for use in their own plants.

Cold-rolled strip steel after being slit has rough square edges. When used for springs, hacksaw blades and some other purposes, edges that are half round, oval or of some other shape are required.

After being slit and coiled the steel is placed on a spool and mounted on the spindle shown at the left of the machine, the end of the strip being passed through a clamp at either end of the machine and is gripped by a coiler at the other end. The coiler draws the strip steel through the machine, past a series of 15 files. The machine has semi-circular cast iron heads mounted in pairs on two rods, the two heads forming a circle. On one side the heads are secured to a rod by set screws. On the other side they are affixed to a movable shaft operated by a lever so that the heads may be opened. A sliding fit of two heads under spring tension is provided.

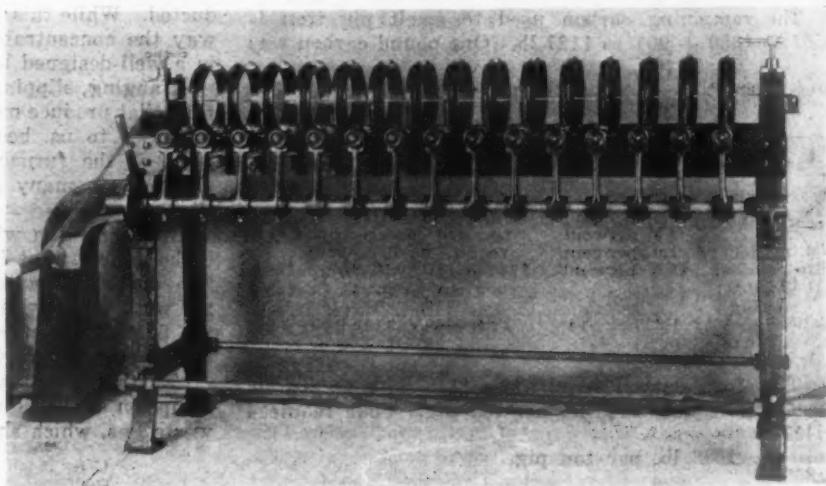
A file holder mounted on each head carries a file $1\frac{1}{4}$ in. wide, $2\frac{1}{4}$ in. long and $\frac{1}{4}$ in. thick, which will cut on both faces. These files are adjustable in any position within 180 deg., and by setting the files in the proper position the desired shaped edge is obtained. The metal passes through the machine in a straight line instead of over and under the files, as in other designs. When a new coil is to be inserted the operator pulls on the lever which opens the 15 heads, and reverses the lever to close the heads. The coiler is arranged for drawing the strip steel through the machine at a speed of 100 to 125 ft. per min., which is the speed at which the steel can be filed. The machine weighs 1000 lb. and is simple in construction and easy to adjust. Its capacity is any gage steel up to 3 in. wide.

The machine was designed by E. W. Duston, formerly chief engineer of the Blake & Johnson Co., Waterbury,

Conn., but now associated with the D. & C. Engineering Co.

Reducing Iron Ores with Carbon Monoxide

A laboratory study of the time rate of reduction of iron oxides by carbon monoxide is under way at the Minneapolis station of the Bureau of Mines. The reducing gas employed will be 35 per cent CO and 65 per cent N₂. The iron oxide will be obtained from the higher grade Lake Superior shipping ores and the reducing gas will be driven through the ore bed at such rates of speed as obtained in blast furnace operation—



Machine for Filing the Edges of Cold-Rolled Strip Steel After Slitting. The steel is coiled, placed on a spool and mounted on spindle shown at left. The strip passes through the machine in a straight line

i. e., about 25 ft. per sec. The rate of the reaction is known to depend primarily upon the gas velocity and the size of the ore particles. To a lesser extent the reaction will depend upon the temperature and the composition of the reducing gas. It is only when conditions of the experiment approximate blast furnace conditions that the laboratory results will have a technical application. Previous workers in this field have invariably used extremely low gas velocities and have used carbon monoxide without dilution in nitrogen. The greater number of them have also sought to obtain equilibrium conditions and no reaction rates. This investigation is undertaken by the Bureau of Mines to supply the need of data which may be of practical use.

Machine for Staybolt Threading

The Warner & Swasey Co., Cleveland, has brought out a staybolt threading machine, made up of its No. 4 turret lathe with a special attachment instead of the regular turret slide and saddle. When not used for staybolt threading the regular turret slide and saddle may be replaced and the machine used for the production of the many miscellaneous studs and bolts necessary in railroad shops.

The machine handles stays of the crown, button-head, or swivel type up to 40 in. in length and for any size of thread, larger or smaller self-opening die heads being used as the situation demands. Present-day practice seems to lead principally toward the use of upset forgings and an increasing number of taper-head staybolts. It is claimed that in a test the button head shown in the illustration was taper formed under



Special Attachment Used for Staybolt Threading, Instead of Regular Turret Slide and Saddle

the head and the thread cut on the end and under the head at the rate of one per min.

In operating the machine, the rough forging is passed through the back of the forward die head to insert in the square collet in the automatic chuck. The die has an enlarged hole in the shank and the chasers an especially large opening movement. After being chucked the staybolt carriage is fed forward until the end of the bolt is supported in the steady rest between the two heads. The head is then formed by the forming cutter on the cross slide, while the other end is supported in the steady rest. Then the staybolt carriage is fed forward, the die heads, operated by the cams on the rear bar, close automatically and cut the threads.

As soon as the die heads reach the end of the cams both heads open. The cams may be made to cut any type thread desired, as the action of the head is dependent upon the contour of the cam. The carriage is then brought back and is ready for the next staybolt. The die heads are placed so that they cut the thread on the end and under the head in continuous lead. The thread on the end is cut without any previous machining.

Phosphor-Copper from Phosphate Rock

General contact is maintained by the Ithaca, N. Y., field office of the Bureau of Mines with the metallurgy of non-ferrous alloys in general and copper alloys in particular. Plans have been made for experimental study of two problems as soon as the other work in progress will allow.

(a) Study of the preparation of phosphor copper by electric smelting direct from phosphate rock. Phosphor copper is an essential material in the production of many high grade bronzes, and is made from elemental phosphorus by different methods, in which there may be loss of phosphorus, danger of fire and of phosphorus poisoning. Besides the possibility of a cheaper method of producing phosphor copper, a study of its preparation by electric smelting should throw light on some problems in the theory of the reduction of phosphatic ores.

(b) The Bureau of Mines is continually in receipt of requests for information in regard to the preparation of such alloys as that of 50 per cent copper and 50 per cent lead. On account of the apparent need for information on melting and casting technique and because it is quite possible that present methods might be improved, a study of the problem is planned.

Chicago Foundrymen's Club

The Chicago Foundrymen's Club will convene on March 11 at the City Club, Chicago. A dinner will be held at 7 p. m. and the meeting will start at 8 o'clock. E. W. Smith, the Crane Co., Chicago, a veteran foundryman, will read a paper on molding sand, its characteristics, the sources of supply and his experiences with it. The discussion will be participated in by R. E. Kennedy, assistant secretary American Foundrymen's Association and secretary of the joint committee on molding sand research of the National Research Council and the American Foundrymen's Association; R. A. Bull, chairman of this joint committee; C. S. McNeal of the Garden City Sand Co., Chicago, and H. S. Vrooman, another veteran sand man.

Metal-Cutting Band Saw

The band saw shown in the accompanying illustration is a recent addition to the line of the Clark Tool Works, Inc., Belmont, N. Y., and is intended for general machine-shop use. In general design it is very much the same as the company's brass-cutting machine.

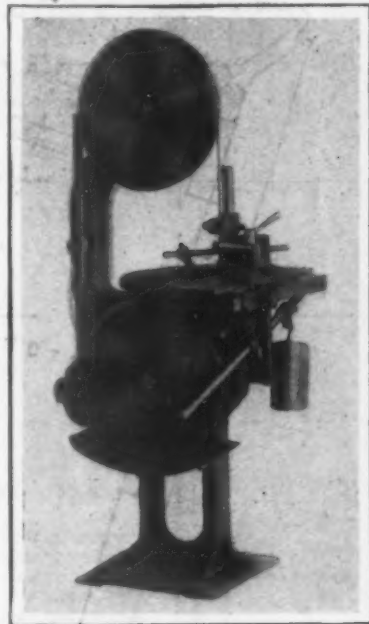
Bearings are designed to require little attention, the lower bearings being lubricated from the gear box and the upper-wheel bearings packed in grease. The machine is

equipped with a moveable carriage and a gravity feed. The vise for holding the work is mounted on the carriage in such a way that by loosening a cap screw it can be turned to permit holding the work at any angle to the saw. This adjustment is for cutting angles. By removing the cap screw the vise can be lifted off, leaving a smooth table 20 by 24 in. for use when cutting plates or irregular shapes.

The table is pivoted in the center and can be swung to allow long bars to clear the saw on the opposite side, and the saw guides are mounted on the table and swing with it, thus holding the saw at right angles at all times. With this construction, it is claimed, the saw is never twisted except when cutting of long pieces and then only enough to clear the opposite side.

The machine has two speeds, which are controlled by a handle on the gear box. The capacity is given as 6 by 12 in. An adjustable ball-bearing stock stand is included in the equipment.

The Summermill Tubing Co., Bridgeport, Pa., manufacturer of steel and non-ferrous metal tubing, reports increasing business. Orders received in the first two months of 1922 are in excess of those received in the last four months of 1921. The company finds that prices of its products are becoming more stabilized and customers are satisfied to book orders ahead.



The Two Speeds Are Controlled by Handle on Gear Box



The Receiving Bay, Which Is Under Cover, Is Commanded by a Traveling Crane, and the Platforms at the Wall on the Left Open into the Ends of the Parallel Factories

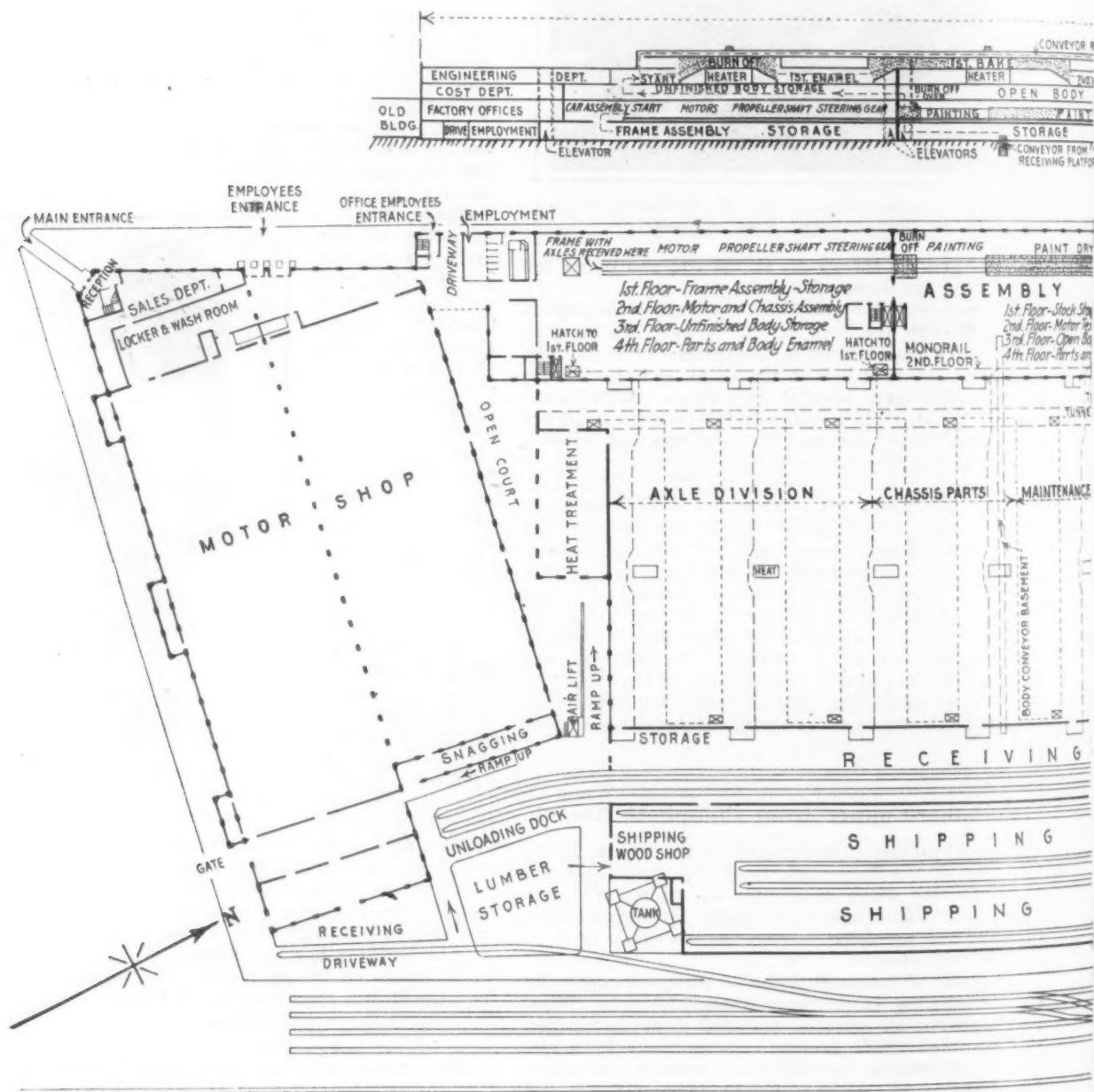
Designing a Modern

What Is Involved in Relations
Many Services Now
Future in Indust

BY PAUL L. BATTEY*

LATE in the summer of 1919 the Willys Corporation undertook the enlargement of the plant of the Duesenberg Motors Corporation at Elizabeth, N. J., having acquired that property together with additional adjacent land, for the manufacture of a new six-cylinder motor car, in the usual four body types. It was the intention to make the complete car in this plant with the exception of rough castings and forg-

*Consulting engineer, 123 West Madison Street, Chicago. Becoming associated in 1901 with the Arnold Co., he has devoted himself since then to the design and construction of industrial plants. The present paper is based on an address he made before the New York section of the American Society of Mechanical Engineers.



PLAN OF THE AUTOMOBILE MANUFACTURING WORKS AT

The Accompanying Longitudinal Sectional Elevation Together
the Continuous Steps in Manufacturing Procedure in This
16 Hr. on 49 Acres of

Automobile Plant

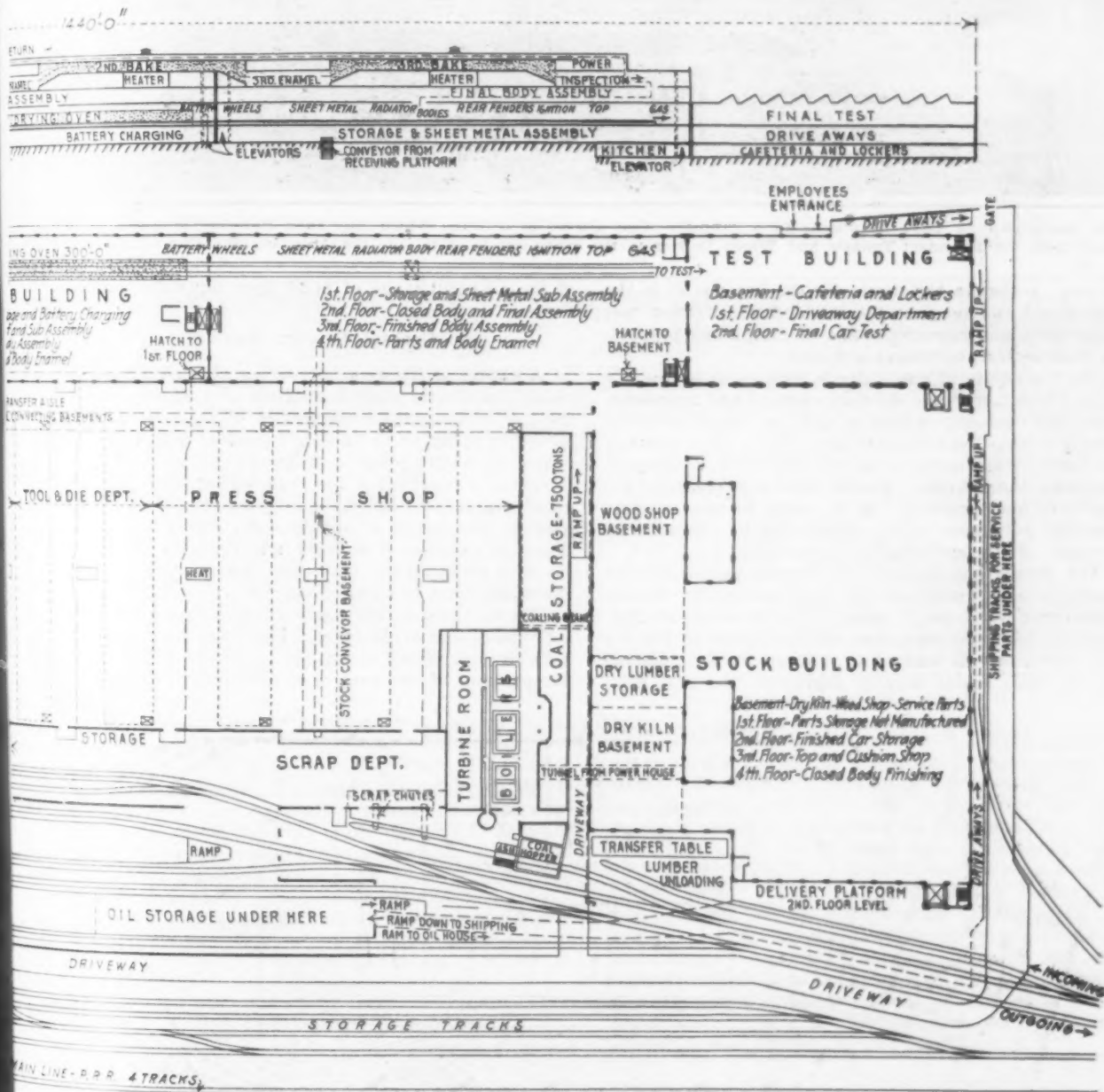
of Departments and in the
Demanded—View of the
rial Developments

ings- and the bodies for the closed types, together with a few miscellaneous specialized items. The car is in the medium price class, but of superior quality and durability.

The writer was retained to design the plant and supervise its construction and the instructions were substantially to provide the most modern and efficient plant possible for the manufacture of 250 cars per day of 8 hr., or 500 cars per day in two 8-hr. shifts. Preliminary layout plans were prepared just previous to Sept. 1 and upon that date the final detail plans were begun. In the latter part of October proposals from



The Base of the Ramp from the Stock Building Ends at the Shipping Dock. At the far end this communicates with the additional loading platform at the right, all under cover, and on the other side of the wall on the right is the incoming receiving bay



ELIZABETH, N. J., BUILT ORIGINALLY FOR THE WILLYS CORPORATION

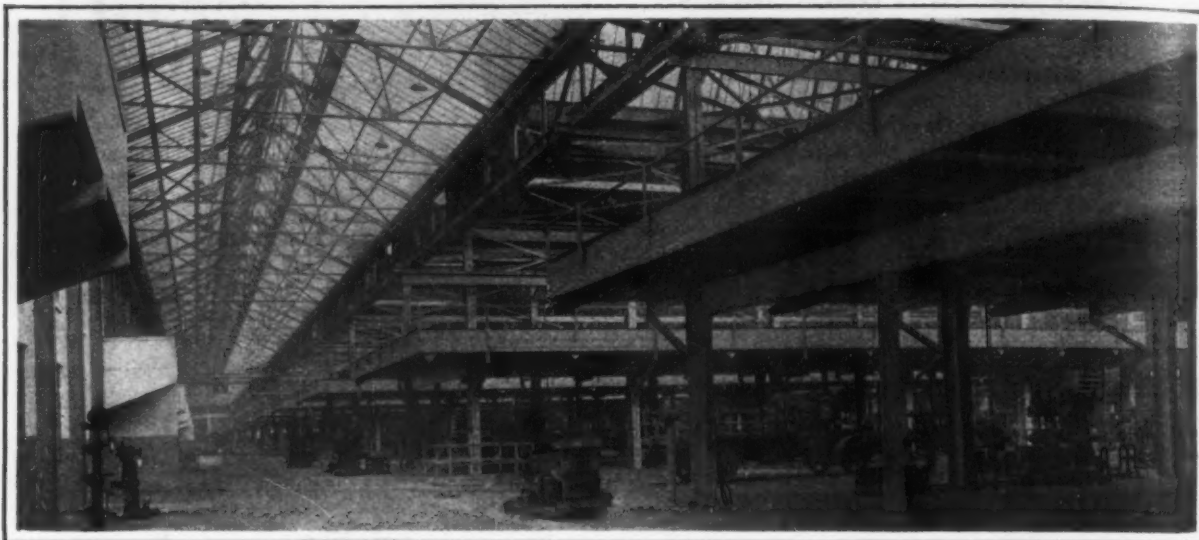
With the Plan Serves without Detailed Description to Indicate
Plant Designed for a Daily Production of 500 Cars in
Factory Floor Space

contractors were received and the first week in November construction was started with the force organized for maximum expedition. The plant was 90 per cent complete eleven months later, when the business depression of 1920 and the resulting financial difficulties caused a delay extending to the present time. During the past year, however, the work progressed upon an extremely limited scale—the plant now being practically complete with the exception of a portion of the manufacturing equipment.

The dominant factor in the design of such plants is simplicity and the degree to which it is carried is the true measure of successful accomplishment. The sim-

tion. In other words install as little as possible and work it as much as possible. This is always the realization of maximum economy.

There are many secondary factors logically grouped under these two of primary importance the detail consideration of which forms the analysis of any industrial problem their "relativity" being generally as elusive as Einstein's. In this particular instance it is proposed to discuss the relation of these factors in their practical application. Such analyses are like problems in calculus with many variables some frequently refusing to "stay put" even long enough to complete the analysis as we are all familiar with the ever impending factor



The Manufacturing Bays Terminate in a Transfer Aisle Served by a Crane Which May Take Material Through Hatchways from the Basement-Tunnels and Which Deliver to the Platforms Opening into the Assembly Building at the Left

ple way is always the most efficient because it is the more direct and requires the least effort; of least cost in operation and investment and of compelling psychology with both management and men.

The teammate of simplicity is usefulness or the use factor which introduces the time element and represents a two-fold economy in that a high use factor not only spreads annual fixed charges but reduces them through the lower depreciation rate on long-lived equipment. Therefore the designer should mentally measure the number of hours each day an item may be used in operation, the maximum hourly output and its character as to length of life and chance of obsolescence.

The writer has become accustomed to thinking of simplicity and usefulness as complementary factors represented by parallel scales; the maximum of simplicity at zero; the maximum of usefulness at 100 per cent. An analysis leading to points of widest divergence on these scales roughly represents the best solu-

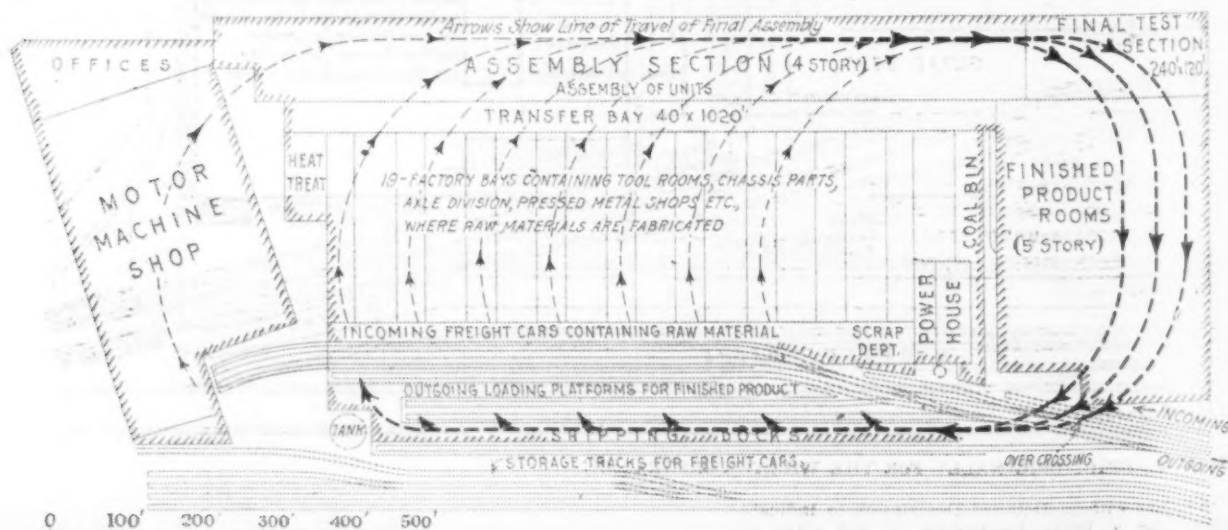
of the client's change of mind upon important predilections.

General Product Routing

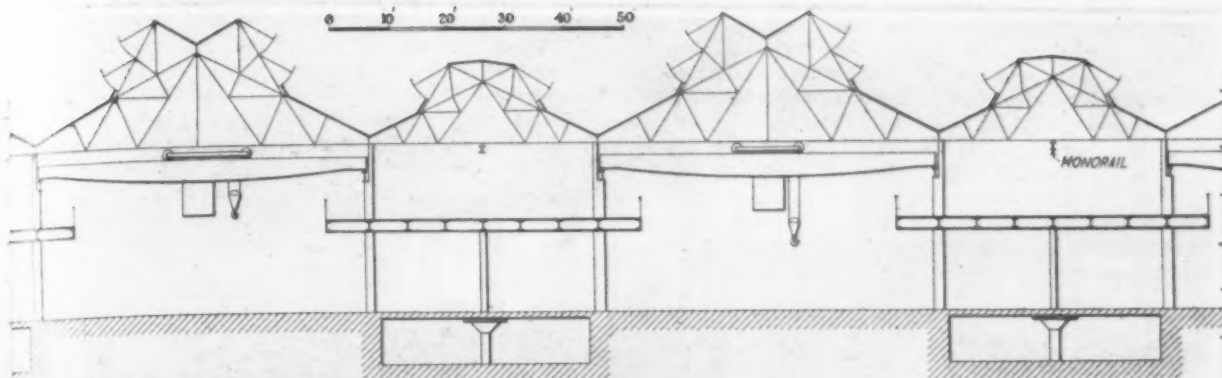
A glance at the general routing plan shows it to be roughly a simple right-hand turn of a spiral. Everything is under cover from receipt of the raw materials to the shipping of the finished product and, as will be noted, the entire plant is contained in one building.

This, to provide for the required capacity, is of unusual magnitude, approximately one-third of a mile long by one-eighth of a mile wide, facing the Lincoln Highway between New York and Philadelphia, and in the rear abutting the main line tracks of the Pennsylvania Railroad entering New York.

The building covers a ground area of 18 acres upon a property site of 25 acres. The total floor space is a little over 2,100,000 sq. ft., or nearly 49 acres. Sixty-five per cent of this area is of fireproof, reinforced con-



The Scheme of Flow of Materials Through the Works and to the Shipping Platforms Is Indicated by This Diagram



General Construction of the Parallel Manufacturing Bays Extending Between the Receiving Bay and the Four-Story Assembly Building. There are 19 such bays, alternately 40 and 60 ft. wide. The 40-ft. bays have balcony floor and a basement space on the level of the receiving bay containing conveyors

crete flat slab construction. The remainder of the new construction is of non-inflammable material throughout, with steel superstructure and concrete tile roof decks. The original Duesenberg building on the south approximately 280 x 500 ft. is of slow-burning mill construction with a saw-tooth roof over the manufacturing area.

The raw materials enter the plant by a track leading directly from the Pennsylvania Railroad drill track and the finished product leaves over a separate track, thus eliminating any interference in the shipping facilities as far as switching is concerned. There is covered track space on the plant property for 80 cars of incoming material spotted ready for unloading and for 60 cars of finished product at the shipping docks. Estimating that one-third of the finished cars will be driven away, the railroad facilities provide for the entire requirements with a single switch on the part of the rail-

Parallel with and immediately next to this, and lying along Newark Avenue, is the assembly building, and continuing northward is the test building. Then to the east along the north end of the property is a large building designated as the stock building, which serves several purposes. The assembly, test and stock building sections are of reinforced concrete construction. The 120 x 1200 ft. assembly building is of four stories and the 120 x 240-ft. test building on the north of two stories and basement, with provision for three more stories. The stock building, 320 x 400 ft., contains four stories and a basement open on three sides, the second floor connecting with the shipping docks by means of a ramp passing over the incoming and outgoing railroad tracks with full 22 ft. clearance.

There was naturally a considerable slope in the property from the front on Newark Avenue to the rail-



The Typical 60-Ft. Bay in the Manufacturing Shop, Showing the Fan Heater Units on the Balconies of the 40-Ft. Bays

road company every day, thus simplifying the transportation factor as much as possible.

The Pennsylvania Railroad has provided immediately adjacent to the plant a storage yard for about 125 cars so arranged with cross-overs as to facilitate switching operations, and about one-half mile to the north of the plant site lies the big Waverly yard of the Pennsylvania, greatly amplifying the available railroad facilities. With the exception of the always desirable switch connection to a second railroad, which was impossible at this site, the transportation facilities are quite as satisfactory as it is possible to provide.

Departmental Arrangement

The factory is divided by fire walls and departmental arrangement into (1) three parallel 60 ft. bays on the east for receiving and shipping. (2) Nineteen 60-ft. and 40-ft. manufacturing bays lying at right angles to the receiving bay, which together with the old Duesenberg building on the south, constitutes the parts manufacturing department. There is a 40 ft. bay, parallel with the receiving bay, serving as a transfer aisle between departments and for intermediate storage of finished parts.

road at the rear—this amounting to a little over 10 ft.—and in order to utilize this to the best advantage and to avoid an expensive grading proposition, the receiving and shipping level was made 10 ft. below the street level. There is also provided on the same level as the receiving floor a considerable area of basement space lying under the alternate 40-ft. bays of the manufacturing section, these basement sections leading from the receiving bay to a connecting tunnel 15 ft. wide lying under the finished parts transfer aisle, this also connecting directly with the basement of the stock building, which is on the same level. This arrangement provides for a complete system of sub-grade internal transportation with contiguous and well distributed storage areas for the several departments.

Detailed Departmental Routing

It will be noted in the detailed plant layout and sections that practically all of the facilities for enameling, painting and varnishing are located on the top floor of the building, to get as far away from dust and dirt of the street level as possible and to minimize fire hazard from these operations. As this could thus be accomplished without seriously increasing the length of travel



This View of the Space Under One of the Balconies Serves to Give an Idea of the Universal Clamping System Employed for Hanging Shafting

of the parts, it was possible to arrange the baking ovens on the roof with inclined approaches from the flow-coat rooms on the fourth floor, thus heat trapping the ovens.

For the motor parts shop, castings and forgings are received in the south end of the receiving bay and on the extension of these tracks which are protected from the weather by overhead shelter.

When taken direct to the motor assembly department on the second floor, they are handled in standard containers by the monorail system, by platform elevator, or by transfer aisle crane and landing decks. A careful study was made of all the various parts entering into the construction of the car and a size and shape of container was chosen which is as universally applicable to all required purposes as possible—it being considered vitally important that all material in process of manufacture should be maintained in mobile units and never piled or binned directly, except where absolutely necessary in a few isolated cases. Standard steel tote boxes of a size which makes up in multiple units to fill the standard container unit, certain combinations being worked out for the various classes of material giving suitable loads for truck, hoist or crane and to simplify as far as possible the checking of stock material for inventory purposes.

These manufacturing bays consist of alternate high bays 60 ft. wide by 40 ft. double deck or balcony bays, the balcony extending on each side into the 60 ft. bay, which contains the crane, thus providing crane transportation for both ground and balcony levels throughout. These departmental bay cranes move at right

angles to the receiving bay, at the dividing wall of which the runway starts, extending to the transfer aisle for finished material. They may move any machine weighing up to 10 or 12 tons direct to the maintenance department and back, thus to shorten the time it is out of service.

In the north end of the receiving bay immediately adjacent to the press shop is located the scrap department. The basements under the 40-ft. manufacturing bays make it possible to deliver much of the scrap from machining operations to the basement floor by means of chutes into scrap trucks. Track space for two cars is provided immediately adjacent to the scrap department with platform for box car loading and overhead gravity chutes from an elevated deck inside the building served with the crane for such scrap material as can be loaded in this manner in open or closed cars.

For such finished materials as may come to the receiving bay to be moved directly to the assembly building, two continuous apron conveyors are provided passing through the basements under the manufacturing bays and via inclined tunnel up to the ground floor of the assembly building.

The plant is not at all dependent upon the monorail system and overhead traveling cranes for handling finished parts from manufacturing departments as ample provision is made for moving materials in containers by trucks, and therefore certain thoroughfares are provided, but careful attention has been given to placing these in locations of least interference with the manufacturing and stocking of parts.

(To be concluded)



There Are Two Chain Conveyor Assembly Units in the Assembly Building, Each Approximately 1050 Ft. Long. They are designed to move about 4 ft. per min., thus completing a car assembly in a little over 4 hr.

BETWEEN MILLSTONES

Midvale Steel & Ordnance Co. Tells What Is the Trouble with Business

The sixth annual report of the Midvale Steel & Ordnance Co. shows the very great change that has taken place since the preceding report was made. In the report for 1920 the opinion was expressed that at least the first half of 1921 would be required for the adjustment to normal of the excessively high freight rates. "Events have shown," says the report for 1921, "that we were unduly optimistic, as the entire year has elapsed and the steel business is still being ground between the upper and the nether millstones of high freight rates and low selling prices for steel products." Continuing, the report says:

"Steel prices have been liquidated to the pre-war level. This is shown by the following statement of base prices, f.o.b. Pittsburgh, of our standard products:

C. per Lb.	Plates	Shapes	Bars
1909.....	1.42	1.42	1.33
1910.....	1.47	1.45	1.44
1911.....	1.31	1.32	1.26
1912.....	1.33	1.32	1.29
1913.....	1.50	1.50	1.55
Five-year average..	1.406	1.402	1.374

"The present selling price of these three standard products is about 1.40c. Steel products have been liquidated to a lower point than most other standard commodities.

"The effect of abnormal freight rates on the consumer of steel products has been to increase both the cost of manufacture (which, manifestly, must be reflected in the selling price eventually), and the prices at point of consumption. While the cumulative amount of freight charges in a ton of steel is always an important item, the rise in the last few years has been alarming. To New York, for example, in 1913, transportation amounted to \$10, or 30 per cent of the delivered price of a ton of plates; to-day it is \$19.07, or 53½ per cent of the price paid by the consumer. This has localized his sources of supply and thus materially limited his opportunity to purchase in competitive markets.

"Wage rates at the mills and furnaces during the

war period and later were advanced approximately 180 per cent. This rate has since been substantially reduced, but is still 47 per cent higher than the pre-war rate.

"As compared with the complete liquidation in selling prices and partial liquidation in labor, freight rates on the materials which must be assembled for the production of steel are still substantially at war levels.

"Railroad prosperity and national prosperity are one and inseparable. We are certain that high freight rates are the principal factor in preventing a return to normal conditions, not only in the steel business, but also in the general business of the country. The railroads claim that they cannot reduce rates unless they are relieved from the oppressive restrictions imposed by the Federal Government and the States. We will not now venture to predict when this situation will be remedied. It is certain, however, that until adjustments are made to conform to peace conditions, no industry in which transportation is a large factor can prosper. This is particularly true of industries which handle large quantities of raw materials.

"Every individual interested in the prosperity of the country at large should urge his representatives in the State Legislature and in Congress to throw their influence into the scale against all artificial restrictions imposed by these agencies which hamper the free operation of economic laws."

The table giving the average number of employees and the expenditures for labor from ore to finished product shows that the pay roll for 1920 was \$58,828,739 compared with \$31,521,531 in 1916 and \$21,860,985 in 1921. The average number of employees ranged from 38,375 in 1917 to 14,432 in 1921, while the average wages per employee per year ranged from \$2,161 in 1920 to \$1,015 in 1916, while for 1921 the amount was \$1,515. Of the six years covered by the table, the shipments were heaviest in 1917 when they reached 1,614,373 tons, and lowest in 1921, when they amounted to 509,849. The inventory at the close of 1921 was \$36,319,212, compared with \$45,393,834 at the end of 1920. The net loss for the year 1921 was \$5,313,173, compared with the net income of \$12,424,919 for 1920. The surplus at the close of 1921 was \$53,551,936, compared with \$59,865,449 at the end of 1920. Cash in banks and on hand at the end of 1921 was \$4,336,125, compared with \$27,684,921 at the end of the year 1920.

TARIFF PLANS

Manufacturers' Association Would Assess Duties in a New Way

WASHINGTON, March 7.—Sponsored by the Manufacturers' Association of New Jersey, Senator Frelinghuysen, of New Jersey, has introduced a bill in the Senate which would assess specific duties on all imports, according to the difference in "conversion costs" here and abroad. The authority for determining these "conversion costs" would devolve on the Tariff Commission to operate under the direction of the Secretary of Commerce, assisted by a body of advisers comprised of bankers, manufacturers, agriculturists, economists, and labor leaders.

The association has announced that it had determined on a nation-wide campaign "to remove the tariff from politics and to urge the enactment of a non-partisan measure based on scientifically appraised specific duties." The bill has created some interest and is being given study by members of Congress, but it is not believed it will be given any serious consideration with a view to urging its adoption in the near future. To do so would require a sweeping change in the plan of the Administration with respect to the Fordney tariff bill, which has been for a number of months, and still is, before the Senate Committee on Finance after passing the House last fall. As is known, delay in reporting this bill is due to differences of opinion as to the basis of valuation for fixing import duties.

The bill introduced by Senator Frelinghuysen is explained in an elaborate statement of the Manufac-

turers' Association of New Jersey and the program laid before members of the House Committee on Ways and Means and the Senate Committee on Finance by J. Philip Bird, president of the association, and Julius Forstmann, of Forstmann & Huffmann Co., Passaic, N. J., members of the association's tariff committee. They have emphasized the necessity for immediate passage by Congress of some temporary tariff bill that will afford protection to American manufacturers while a scientific measure is being prepared.

It is known that Secretary of Commerce Hoover does not favor the idea of having the Tariff Commission operate under his direction. Apparently Mr. Hoover feels that he already has enough duties to perform without having thrust upon him the responsibility of the work of a tariff commission.

The Aluminum Goods Mfg. Co., Manitowoc, Wis., with branch factories in Two Rivers, Wis., Newark, N. J., and St. Louis, has informed its employees that it has arranged for an increase in the amounts of the policies they hold under the corporation's group insurance plan. The new plan will be effective as of Jan. 1, although just announced. Under the plan an increase of \$100 is made in the amount in all classes, with a new class added giving employees under 45 years who have been in the company's service five years or longer \$1,500 of insurance; between 45 and 54, \$1,000, and between 55 and 59, \$700. Female employees are insured regardless of age. Since the institution of the group insurance plan, the company has paid more than \$30,000 in claims on 47 deaths among employees of its five plants.

Mass in the Heat Treatment of Steel

A Suggested Formula for Calculating the Brinell Hardness from Given Data—Applicable to Alloy and Carbon Steels

IN the paper dealing with the influence of mass in heat treatment, read at the Indianapolis convention of the American Society for Steel Treating, and published in the October, 1921, issue of the society's *Transactions*, the author confined himself to data taken on a 0.45 per cent carbon steel, as published by the British Engineering Standards Association in its report No. 75, dated October, 1920. In the paper it was shown that the hardness-mass formula is:

$$B = \frac{nC}{(D-d)} + b$$

in which B is the Brinell hardness of any section.
 n is a factor which is constant for each steel of a particular analysis.
 C is 14,125, which represents the product of the diameter and surface per pound of steel of any round section.
 D is the diameter of the section, the hardness of which is desired.
 d corresponds to the vertical asymptote of the curve.
 b is the normalized Brinell hardness of the steel.

The object of the present paper is to show that the same general formula that was used for plain carbon

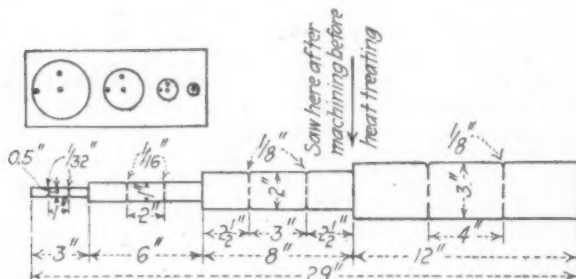


Fig. 1—Standard Test Specimen for Determining the Influence of Mass in Heat Treatment. In the upper left-hand corner are shown cross sections of the four diameters, indicating the points at which Brinell measurements were taken

steel is applicable to structural alloy steels; also that this formula holds good for the "midway" Brinells, that is, Brinell hardnesses taken half way between the centers and outsides of rounds on their cross sections.

In his previous paper, the author pointed out that n is a factor which is constant for each steel of a particular analysis, and which appears to be, for plain carbon steel, the square of the hardening capacity of the steel in question. As the variable d is a function of the factor n , it is obvious that n is the salient point of the formula.

From experiments soon to be described on two nickel steels, one chrome-nickel steel and from data given by the British Engineering Standards Association on a 5 per cent nickel case-hardening steel, it became apparent that the factor n for structural alloy steel is twice the square of the hardening capacity, or more generally expressed, a multiple of the square of the hardening capacity, thus:

$$n = 2 \left(\frac{B_m}{b} \right)^2 \quad \text{in which}$$

B_m is the maximum Brinell hardness which can be developed in the steel.
 b is the normalized Brinell hardness of that steel.

Thus, for a 0.32 per cent carbon, 3.25 per cent nickel steel,

$$n = 2 \left(\frac{532}{196} \right)^2 = 14.73$$

*A paper presented at the New York Sectional Meeting of the American Society for Steel Treating, March 3. The author, E. J. Janitzky, is metallurgical engineer, Illinois Steel Co., South Chicago, Ill. In this paper the author has answered the criticisms of Sir Robert Hadfield on his previous paper, which appear on page 396 of the February issue of *Transactions*.

For an 0.42 per cent carbon, 3.15 per cent nickel steel,

$$n = 2 \left(\frac{600}{217} \right)^2 = 15.27$$

For an 0.34 per cent carbon, 1.20 per cent nickel, 0.56 per cent chromium steel,

$$n = 2 \left(\frac{555}{217} \right)^2 = 13.08$$

For an 0.17 per cent carbon, 5 per cent nickel case hardening steel,

$$n = 2 \left(\frac{388}{187} \right)^2 = 8.6$$

The specimen used to make these experiments is shown in Fig. 1. It is composed of four sections, each nicked circumferentially as indicated, so that, at the nicks, the diameters of each of the sections respectively is approximately 0.5, 1.0, 2.0 and 3.0 in. It is best to cut the specimen into two parts before quenching, as this facilitates handling; cutting should be done at the junction of the 2 and 3-in. sections as shown in Fig. 1. After quenching the test pieces should be broken at the nicks and the fractured surfaces ground. Brinell hardness numbers should then be obtained on three places of the ground cross sections, thus, close to the surface (circumferential), midway and in the center. In a 0.5-in. round there will be little or no variation in hardness between the center and the outside, but it is obvious that as the section grows larger this difference becomes greater. Ordinarily after quenching the 3-in. round can be cut with a saw in which case, of course, it is not necessary to fracture it.

It will be noted in all of the following tables that the hardness of the 0.5-in. section is not calculated. The 0.5-in. section is used only to obtain the maximum hardness which can be developed in the steel. A section of this diameter has been chosen to determine the maximum Brinell hardness because it is the smallest one which can be treated practically and brinelled on the cross section. A smaller section is liable to crack

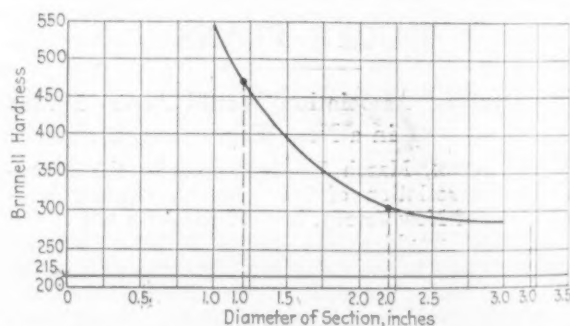


Fig. 2—Water Quench Curve Showing Relation of Brinell Hardness to Diameter of Section. After determining the Brinell hardness of a 1-in. section, for example, locate this point on the curve and, using the same horizontal scale, read off the Brinell hardness of other sections

in drastic quenching and does not allow the Brinell hardness of it to be obtained.

When a section of steel is quenched, a section so small that it has on quenching a perfect martensitic structure, the quenching of a smaller section will not give a higher Brinell hardness than that obtained in the section just mentioned. Thus, in alloy steels of the structural type, this largest section at which the maximum Brinell hardness can be obtained is on a section having a diameter somewhere between 0.5 and 1.0 in. Therefore it is not to be expected that the theoretical curve will pass through the point corresponding to the actual Brinell hardness obtained for 0.5 in.

The following tables give actual and calculated data of the center and midway Brinell hardness of sections whose diameters are shown:

(1) *Nickel steel, 3.50 per cent, quenched in water at 1450 deg. Fahr.*—The composition of the steel was carbon, 0.32; manganese, 0.56, and nickel, 3.25 per cent.
 $B_m = 532$, $b = 196$, thus

$$n = 2 \left(\frac{B_m}{b} \right)^2 = 14.73$$

Center Data

$$\text{for 1 in., } d = 1 - \frac{(14.125)(14.73)}{430 - 196} = 0.111$$

$$B = \frac{(14.125)(14.73)}{D - 0.111} + 196$$

The following results were obtained:

Diameter of section, inches	Actual Brinell hardness	Calculated Brinell hardness
0.50	532	532
0.73	430	430
1.00	302	306
2.00	348	268

Midway Data

$$n = 14.73$$

$$\text{for 1 in., } d = \frac{(14.125)(14.73)}{444 - 196} = 0.260$$

$$B = \frac{(14.125)(14.73)}{D - 0.260} + 196$$

The following results were obtained:

Diameter of section, inches	Actual Brinell hardness	Calculated Brinell hardness
0.50	532	532
0.879	477	477
1.00	302	315
2.00	255	272

(2) *Nickel steel, 3.50 per cent, quenched in water at 1450 deg. Fahr.*—The composition of the steel was carbon, 0.42; manganese, 0.61, and nickel, 3.15 per cent.
 $B_m = 600$, $b = 217$, thus

$$n = 2 \left(\frac{B_m}{b} \right)^2 = 15.27$$

Center Data

$$\text{for 1 in., } d = 1 - \frac{(14.125)(15.27)}{540 - 217} = 0.332$$

$$B = \frac{(14.125)(15.27)}{D - 0.332} + 217$$

The following results were obtained:

Diameter of section, inches	Actual Brinell hardness	Calculated Brinell hardness
0.50	600	600
0.896	540	540
1.00	321	346
2.00	286	298

Midway Data

$$n = 15.27$$

$$\text{for 1 in., } d = 1 - \frac{(14.125)(15.27)}{555 - 217} + 0.362$$

$$B = \frac{(14.125)(15.27)}{D - 0.362} + 217$$

The following results were obtained:

Diameter of section, inches	Actual Brinell hardness	Calculated Brinell hardness
0.5	600	600
0.925	555	555
1.0	340	349
2.0	302	300

(3) *Chrome-nickel steel quenched in water at 1535 deg. Fahr.*—The composition of the steel was carbon, 0.34; manganese, 0.50; nickel, 1.20, and chromium, 0.56 per cent.

$B_m = 555$ and $b = 217$, thus

$$n = 2 \left(\frac{B_m}{b} \right)^2 = 13.08$$

Center Data

$$\text{for 1 inch, } d = 1 - \frac{(14.125)(13.08)}{477 - 217} = 0.289$$

$$B = \frac{(14.125)(13.08)}{D - 0.289} + 217$$

The following results were obtained:

Diameter of section, inches	Actual Brinell hardness	Calculated Brinell hardness
0.50	555	555
0.836	477	477
1.00	340	325
2.00	286	285

Midway Data

$$n = 13.08$$

$$\text{for 1 inch, } d = 1 - \frac{(14.125)(13.08)}{495 - 217} = 0.336$$

$$B = \frac{(14.125)(13.08)}{D - 0.336} + 217$$

Diameter of section, inches

Actual Brinell hardness

Calculated Brinell hardness

0.5	555	555
0.883	495	495
1.0	340	328
2.0	302	286

(4) *Nickel case hardening steel, 5 per cent, quenched in water at 1580 deg. Fahr. and requenched in water at 1400 deg. Fahr.* (From British Report).

The composition of the steel was carbon, 0.17; manganese, 0.34, and nickel, 6.0 per cent.

$B_m = 388$, $b = 187$, thus

$$n = 2 \left(\frac{B_m}{b} \right)^2 = 8.6$$

$$\text{for } 1\frac{1}{2} \text{ in., } d = 1.125 - \frac{(14.125)(8.6)}{363 - 187} = 0.435$$

$$B = \frac{(14.125)(8.6)}{D - 0.435} + 187$$

The following results were obtained:

Diameter of section, inches	Actual Brinell hardness	Calculated Brinell hardness
0.6875	388	388
1.04	363	363
1.125	321	300
1.50	277	259

In regard to the formula, it would appear that the Brinell hardness of the steels in the annealed state should be taken for b ; however, as we do not deal with sections of indefinite diameter, the value used for b is that of the steel in the normalized condition. It seems to answer the purpose of the formula better for engineering purposes.

It is also obvious that in the case of specimens drawn or quenched in different media, the same procedure should be followed as that in this paper. It is not necessary to calculate the Brinell hardness for sections drawn or quenched in different media, if the water quench curve for that particular steel is at hand. It is only necessary to obtain the Brinell hardness of say, a 1-in. section, fix this point on the water quench curve and using the same scale, read off the Brinell hardnesses of other sections, as shown in Fig. 2.

Attention is called to the fact that the results given in this paper are not averages of a number of tests. They represent a single result of one investigator. If this experiment would be carried out by a number of investigators and the results averaged, still closer checks between the actual and calculated values would be expected.

In concluding the author wishes to state that whereas the first paper was a demonstration of the hyperbolic tendency of the curve of the physical properties of steel sections of the same analysis, this paper endeavors to cover the practical application when one is confronted with the mass problem.

Experiments on Sponge Iron

At Minneapolis, the Bureau of Mines is making a study of the properties of steel made in an electric furnace from sponge iron. The steel has been furnished by the California Electric Steel Co., Los Angeles. Chemical and microscopic analyses are being made. The effect of heat treatment on the physical properties of this steel will then be determined by the usual tests for tensile strength, elasticity, hardness, etc.

At the Northwest station of the Bureau of Mines, Seattle, Wash., a study is being made of the melting of sponge iron. In work recently performed foundry iron has been made by melting sponge iron. The maximum amount of carbon introduced was 3.00 per cent. Further work is being undertaken in which the attempt is made to introduce more carbon. Other tests are to be made with the idea of producing low-carbon and high-carbon steels. All of these tests will necessitate the control of the introduction of carbon and silicon and of removing sulphur and phosphorus.

At Seattle the preparation of sponge iron is being undertaken by the Bureau of Mines with two objects in view: First, to supply sponge iron for copper precipitation, and, second, for melting and conversion into the most suitable iron or steel product.

Progress of Steel Making in Australia

Member of Queensland Parliament Tells What Has Been
Accomplished and Speaks of Prospects—
Iron Ore Is of High Grade

BY RANDOLPH BEDFORD*

I AM glad to accept the invitation of the editor of THE IRON AGE to write, while in New York, a short statement concerning the iron and steel trade of Australia and its projected extensions.

The history of iron smelting and steel production in Australia is the history of a few men putting up a long and gallant fight against ignorant opposition, and against the stupid and slipshod methods that belong to free trade.

To the end of 1886 the greater quantity of the pig iron produced in New South Wales from local ores was the output of Sandford's iron works at Lithgow, stated by the proprietor at 21,880 tons. The Fitzroy furnace's only record is 3242 tons; but it was in blast intermittently for years prior to that record, and must have produced more than the record. This much is certain: that up to 1901 the total iron product from New South Wales ores was under 30,000 tons.

True to the free trade of the time, even if Australia could make iron, it was still too thick-headed to manufacture iron into articles, and a lot of the New South Wales pig was sold to San Francisco. Mac-Condray & Co., of San Francisco, wrote in 1868:—"The parcels of your pig iron received here have given great satisfaction. We can dispose of 300 tons a month, and it would command from \$2 to \$4 a ton more than any other iron imported into California."

Broken Hill Development

The development of Broken Hill has had tremendous effect on general Australian developments of industries and men. Its general operation has trained Australian engineers, as its zinc problem has educated Australian chemists. It developed the local industry of making coke—which used to come from Germany; and its educative influence can be found on every notable mining field in Australia to-day. At Newcastle it is the key industry to most industries of the land; it has attracted to itself satellite industries working up its by-products such as that of tar from the coke ovens; and it has grouped around it wire and wire netting factories with galvanized iron and nail factories, and tin plate factories to come.

In the extension of its coke ovens and the ability to supply customers with surplus waste gases for power, a tremendous extension of its business has come; grouping around it industries in no way allied to it, and rapidly erecting Newcastle into the position of the Pittsburgh of the Commonwealth.

The great rich iron deposits of Australia are many, but there are none better than the Broken Hill Proprietary Co.'s iron mines of the Iron Knob and Iron Monarch at Spencer's Gulf (S. A.). The Iron Knob ore bulks 68 per cent, metallic iron and has 10,000,000 tons in sight. That is to be read with the fact that the hematite deposits of Lake Superior average 50 to 55 per cent and bear a railage of 1000 miles to the coal of Pittsburgh. To make a ton of pig iron requires these varying quantities of ore in the countries named:

United States (nearly).....	2 tons ore to 1 ton pig
Sweden and Russia.....	2 tons ore to 1 ton pig
Britain and Germany.....	2.4 tons ore to 1 ton pig
France and Belgium.....	2.7 tons ore to 1 ton pig
All native British ores.....	3 tons ore to 1 ton pig
Iron Knob (Australia).....	1.5 tons ore to 1 ton pig

The 1921 output of the Broken Hill Company's works at Newcastle (New South Wales) included 251,417 tons pig, 219,973 tons steel ingots and 8723

tons billets, and 176,000 tons rails, bar, rod, plate and structural steel.

Australia's Importations

Yet Australia, suffering under an inadequate tariff, imported in 1919-20 manufactures of steel to the value of \$29,000,000. Some of this was Belgian—and some of that was suspected of German origin. Until we can overhaul that value by local production, Australia would prefer to do that business with the United States of America which has money to buy our products in return. The preference to Britain should be extended to preference to the English-speaking countries. At the moment we are importing from Japan general merchandise in such volume that it is disquieting; for rightly or wrongly most Australians believe that every dollar sent to Japan gives Japan another cartridge or two for the white man.

In the State of whose Legislature I am a member (Queensland) the steel shortage of the war impelled us to move for the establishment of State steel works because private enterprise had neglected it largely because of low duties. Besides the Newcastle steel works of the Broken Hill Proprietary Company, the State of New South Wales houses the important Hoskin's works at Lithgow. Combined these ironmasters could not then meet the demand and small steel foundries were during the war buying scrap iron up to \$30 per ton.

Great Iron Deposits

Yet every State has great iron deposits. Beginning in the South, Tasmania has great iron reserves at Blythe River and Penguin, by the sea; Victoria at Nowa Nowa (at present inaccessible for production in quantity); New South Wales at Carcoar, Cadia and other places connected by railroad with the sea; South Australia at Iron Knob, which supplies Newcastle; Queensland at Biggenden, Cloncurry, Iron Island and other places, and West Australia at Yampi Sound. The Queensland Government has a vast coal-field now being connected by railroad with the deep water port of Bowen (about 17 days distant from San Francisco) and our Parliament has passed a bill providing for the establishment of State steel and iron works at Bowen. Contemporaneously the State Government secured by private purchase and by concession from the West Australian Government the iron deposits of Yampi Sound, situated in latitude 16° 8' South and longitude 123° 45' East. The largest ships afloat can enter or leave Yampi at any time of the tide.

The deposits are in the form of huge beds of dense solid steel-gray crystalline hematite, and there are roughly 15,000,000 tons on Cockatoo Island above high water mark. On Coolan Island there are 70,000,000 tons above high water mark; recoverable without any removal of over-burden. Other ore bodies represent 15,000,000 tons—a total of 100,000,000 tons above high water in sight—which probably represent a hundredfold of the quantity to be developed by mining.

The ore is very even in quality and very free from deleterious qualities. Phosphorus is below the limit of 0.05 per cent allowable for acid open-hearth treatment, or 0.10 per cent allowable for acid Bessemer ores.

The method of working will be by heavy charges of explosives breaking thousands of tons at a shot, blowing out the width of the ore body clean from the footwall, and throwing the ore down to near sea-level, whence it can be loaded to the ships. The proposition is that ships shall load ore at Yampi, transport it to

*Member of the Parliament of Queensland, Australia.

the State coal fields at Bowen, and take back loading of coal to Java en route to Yampi for further cargo. The value of the ore is best shown by these comparisons.

Analyses of Well-Known Hematites in Comparison with Yampi

	Metallic Iron Per Cent	Sulphur Per Cent	Phosphorus Per Cent
Lake Superior, average, 1909.....	58.45	0.06	0.91
Newfoundland (Bell Island), average 1910-1912.....	51.88	0.018	0.70 to 0.85
Cuba (Daiquiri), average 1907.....	57.80	0.18	0.034
Brazil, 9 analyses, 63.01 to 69.35		0.01 to 0.03	0.010 to 0.184
France (Pyrenees), average 1 year.....	57.28	0.33	0.009
England (Cumberland), 6 representative analyses.....	48.81 to 62.11	0.004 to 0.02	0.009 to 0.022
Spain (Bilbao).....		n. d.	0.029
Rubio.....	50.84		
China (Hanyang).....	60.0 to 62.0	0.05 to 0.012	0.05 to 0.25
India (Oressa).....	64.0 to 69.0	0.021 to 0.036	0.048 to 0.135
Algiers, 5 analyses.....	43.35 to 57.10	0.017 to 0.045	0.009 to 0.035
Yampi, 7 analyses.....	68.99 to 60.91	0.01 to 0.07	0.008 to 0.062

Analyses of coal of the Bowen field are as hereunder. The largest seam is the Bowen averaging 18 ft. in thickness; and others are the Garrick averaging 7 ft. 6 in., and the Denison seam from 3 to 6 ft. thick.

<i>Bowen Seam</i>			
Moisture.....	0.11 per cent		
Volume hydrocarbons..	0.1 per cent	0.105 per cent mean	
Ash.....	21.0 per cent		
	20.6 per cent	20.9 per cent mean	
Fixed carbons by difference.....	11.98 per cent		
	11.96 per cent	11.97 per cent mean	
		67.025 per cent mean	
		100.00 per cent mean	
Sulphur.....	0.98 per cent		
	0.84 per cent		
Mean.....	0.96 per cent		
<i>Garrick Seam</i>			
Moisture.....	0.11 per cent		
Volume hydrocarbons..	0.11 per cent	11.0 per cent mean	
Ash.....	21.8 per cent		
	22.2 per cent	22.0 per cent mean	
Fixed carbons by difference.....	13.7 per cent		
	13.66 per cent	13.68 per cent mean	
		100.00 per cent mean	
Sulphur.....	1.2 per cent		
	1.4 per cent		
Mean.....	1.3 per cent		

In San Francisco I was told that steel manufacture on the Pacific Coast would be established if a new supply of cheap coke should offer. In the making of coke at Bowen as one of the activities of steel production in Australia, there will probably be found the means to bring our two countries in close association in trade as already they are allied by a strong and continuously increasing sentiment.

Steel Mill Employment Increases

WASHINGTON, March 7.—The iron and steel industry, with an increase of 7256 employees, or 2.2 per cent, showed a larger gain in employment in February over January than any other of the 14 industries reporting to the United States Employment Service, except the vehicles for land transportation. In this case the gain was 11,149 employees, or 6.5 per cent. All but two industries, textiles and their products and paper and printing, showed gains. The total net gain, however, was only 8894 employees, or 0.57 per cent, the total gain of 28,131 being offset by a decrease of 19,237 in the two industries showing losses. Of this decrease, 19,152 was in the textile industry and is attributed to the strike.

An increase of 2471 was made in metal and metal products, and of 2452 in railroad repair shops. Iron and steel towns showing gains in February over January were Johnstown, Pa., 1960, or 22.5 per cent; Cleveland, 3806, or 5.5 per cent; Birmingham, Ala., 1130, or 5 per cent; New York, 2744, or 1.9 per cent; Pittsburgh, 1215, or 1.7 per cent. Decreases were shown by Youngstown, Ohio, 679, or 2.4 per cent; Philadelphia, 953, or 0.96 per cent; Chicago, 842, or 0.5 per cent.

IRON AND STEEL MOVEMENTS

More Than One-Quarter of All Water Traffic Consists of Ferrous Materials

In a volume of commercial statistics for 1920, the statistical division of the Board of Engineers for Rivers and Harbors has published a volume of more than 1400 pages, showing the movements of export and import tonnage and of river and canal tonnage for a vast quantity of materials. The table showing the movements of iron and steel gives both the imports and exports in foreign commerce, and the receipts and shipments in domestic commerce, for the year 1920, with comparative figures for 1919. The table gives the movement by ports on the Atlantic, Gulf and Pacific coasts and on the Great Lakes, the latter being domestic shipments, mainly of iron ore. The table gives also the movements on canals, on the Mississippi River and on rivers of the Atlantic, Gulf and Pacific coasts.

It may be pointed out that the total iron and steel movement shown, amounting in 1920 to 189,617,864 net tons, is 36¼ per cent of the entire movement for the year of the twelve principal products, aggregating 523,267,141 net tons. It is also 27 per cent of the 703,675,131 tons of all products moved by water. The principal information regarding movements of iron and steel for the two years will be found in the appended table.

Movement of Iron and Steel by Water (Net Tons)

	1919	1920	Increase, Per Cent
Imports: Atlantic coast.....	471,030	637,548	35.3
Gulf coast.....		32,046	...
Pacific coast.....	2,905	47,469	...
Great Lakes.....		124,340	...
Total.....	473,935	841,403	77.5
Exports: Atlantic coast.....	135,656	(c) 990,634	566.2
Gulf coast.....	(a) 210,664	300,225	42.5
Pacific coast.....	403,156	238,401	-40.9
Great Lakes.....		1,281,795	...
Total.....	749,476	2,724,055	263.5
Total foreign commerce.....	1,223,411	3,565,458	191.5
Domestic receipts: Great Lakes	51,584,356	63,993,374	24.0
Seacoasts.....	1,122,645	334,660	-70.2
Rivers and canals.....	10,111	397,295	...
Total.....	52,717,112	64,665,329	22.7
Domestic shipments: Great Lakes	52,019,248	63,301,034	21.7
Seacoasts.....	160,686	298,396	85.7
Rivers and canals.....	160	439,647	...
Total.....	52,180,094	64,039,077	22.7
(b) Total domestic commerce..	105,612,629	186,052,406	76.2
Total movement recorded.....	106,836,040	189,617,864	77.5
Adjusted movement*.....	54,029,725	96,591,661	78.8

*Eliminating all known duplications; consists of total foreign commerce added to one-half the domestic figures.

(a) Includes 75,870 tons of river movement.

(b) Includes local traffic not segregated.

(c) Includes 51,274 tons of river movement.

Newport Company Will Not Move

Officials of the Newport Rolling Mill Co., Newport, Ky., state that it is not the intention of the company to move from Newport. During the height of the strike troubles the desirability of moving the plant was considered, but with the re-establishment of order in the strike zone and the assurance that the operations of the company will not be interfered with, the consideration of moving the plant to some other city was dropped. Communications from approximately 35 cities from all sections of the United States, offering the company various inducements to locate their plant in these cities, were received.

The sixth annual meeting of the American Gear Manufacturers' Association will be held at the Hotel Lafayette, Buffalo, April 20 to 22, inclusive.

FEBRUARY PIG IRON OUTPUT

A Gain of 5,151 Tons Per Day Over January

Seventeen Furnaces Blown In, Five Blown Out

The steady increase in the pig iron production of the country which characterized the last few months of 1921, but which came to a standstill in January, was resumed in February with decided impetus. The production in February was 5151 tons per day larger than that in January which contrasts with a decline in January from December of 133 tons per day and a gain in December over November of 6013 tons per day. As in January the feature of the February production was the relatively high output of steel-making pig iron which showed an increase of 4697 tons per day over January.

The production of coke and anthracite furnaces for the 28 days in February amounted to 1,629,991 gross tons, or 58,214 tons per day, as compared with 1,644,951 tons, or 53,063 tons per day in January, a 31-day month. Owing to an error in the returns of one furnace, the January figures have been revised upward from those published Feb. 9. The output last month was larger than the March output last year and was only 307,266 tons less than in February, 1921.

The total number of furnaces in blast on March 1 was 138 as compared with 126 on Feb. 1. This number is just twice the number of furnaces in blast on Aug. 1, 1921, at the low point in the depression, when only 69 were operating. The capacity of the 138 furnaces in blast March 1 is estimated at 59,080 tons per day, as contrasted with a capacity of 53,305 tons per day for the 126 furnaces in blast Feb. 1. In February 17 furnaces were blown in and 5 were blown out.

Of the manganese-iron alloy output in February of 8540 tons, spiegeleisen constituted 4930 tons and ferromanganese 3610 tons, the latter being a decided decline from the January output of 5644 tons.

Daily Rate of Production

The daily rate of production of coke and anthracite pig iron by months, from February, 1921, is as follows:

Daily Rate of Pig Iron Production by Months—Gross Tons

	Steel Works	Merchant	Total
February, 1921	58,060	11,127	69,187
March	42,691	8,777	51,468
April	33,854	5,914	39,768
May	33,054	6,340	39,394
June	29,444	6,050	35,494
July	23,086	4,803	27,889
August	26,037	4,743	30,780
September	27,189	5,661	32,850
October	33,365	6,850	40,215
November	37,960	9,223	47,183
December	41,173	12,023	53,196
January, 1922	42,130	10,933	53,063
February	46,827	11,387	58,214

The figures for daily average production, beginning with January, 1916, are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1916—Gross Tons

	1916	1917	1918	1919	1920	1921	1922
Jan. 102,746	101,643	77,799	106,525	97,264	77,945	53,063	
Feb. 106,456	94,473	82,835	105,006	102,720	69,187	58,214	
Mar. 107,667	104,832	103,648	99,685	108,900	51,468		
Apr. 107,592	111,165	109,607	82,607	91,327	39,768		
May 108,422	110,238	111,175	68,002	96,312	39,394		
June 107,053	109,002	110,793	70,495	101,451	35,494		
July 104,017	107,820	110,354	78,340	98,931	27,889		
Aug. 103,346	104,772	109,341	88,496	101,529	30,780		
Sept. 106,745	104,465	113,942	82,932	104,310	32,850		
Oct. 113,189	106,550	112,482	60,115	106,212	40,215		
Nov. 110,394	106,859	111,802	79,745	97,830	47,183		
Dec. 102,537	92,997	110,762	84,944	87,222	53,196		

Among the furnaces blown in during February were the following: One Donner furnace in the Buffalo district; No. 2 Swede furnace in the Schuylkill Valley; No. 1 Clairton, No. 3 Duquesne furnaces and No. 2 Lucy furnace of the Carnegie Steel Co. and one Monessen furnace of the Pittsburgh Steel Co. in the Pittsburgh district; one Johnstown furnace of the Cambria Steel Co. and the Perry furnace in Western Pennsylvania; No. 1 furnace of the National Tube Co. and the Dover furnace in Central Ohio; No. 4 Joliet furnace of the Illinois Steel Co., No. 11 Gary furnace and No. 1 Madeline furnace in the Chicago district; Detroit furnace B in Michi-

gan; No. 4 Ensley furnace of the Tennessee Coal, Iron & Railroad Co. and the Alabama City furnace of the Gulf States Steel Co. in Alabama. The Adrian furnace, reported blown out in January, was in blast and is included in the February totals.

Among the furnaces blown out during February were the following: The Northern furnace of the Witherbee Sherman Co. in New York; the Saucon furnace of the Thomas Iron Co. in the Lehigh Valley; Newcastle No. 1 of the Carnegie Steel Co. in the Shenango Valley; Mary furnace in the Mahoning Valley and one Madeline furnace in the Chicago district.

Output by Districts

The accompanying table gives the production of all coke and anthracite furnaces for February and the three months preceding:

Pig Iron Production by Districts, Gross Tons

	February (28 days)	January (31 days)	December (31 days)	November (30 days)
New York	105,708	110,867	126,734	91,535
New Jersey	3,947	4,642	5,026	4,525
Lehigh Valley	29,094	31,296	31,388	30,020
Schuylkill Valley ..	44,674	42,144	41,450	35,850
Lower Susquehanna and Lebanon Val- leys	26,074	28,227	26,106	19,356
Pittsburgh district..	388,698	382,407	390,908	337,851
Shenango Valley...	52,402	54,234	52,793	50,555
Western Penna....	61,459	45,511	56,593	67,432
Maryland, Virginia and Kentucky....	22,222	22,858	18,917	14,754
Wheeling district...	69,865	75,576	72,660	44,966
Mahoning Valley...	172,136	190,436	188,391	165,562
Central and North- ern Ohio.....	187,918	161,160	167,307	156,767
Southern Ohio.....	30,568	31,892	15,534	13,893
Illinois and Indiana	273,444	287,313	299,180	252,566
Mich., Minn., Mo., Wis. and Colo....	51,233	48,236	37,149	20,059
Alabama	109,667	121,073	117,886	108,125
Tennessee	882	825	1,064	1,665
Total.....	1,629,991	1,638,697	1,649,086	1,415,481

Capacities in Blast March 1

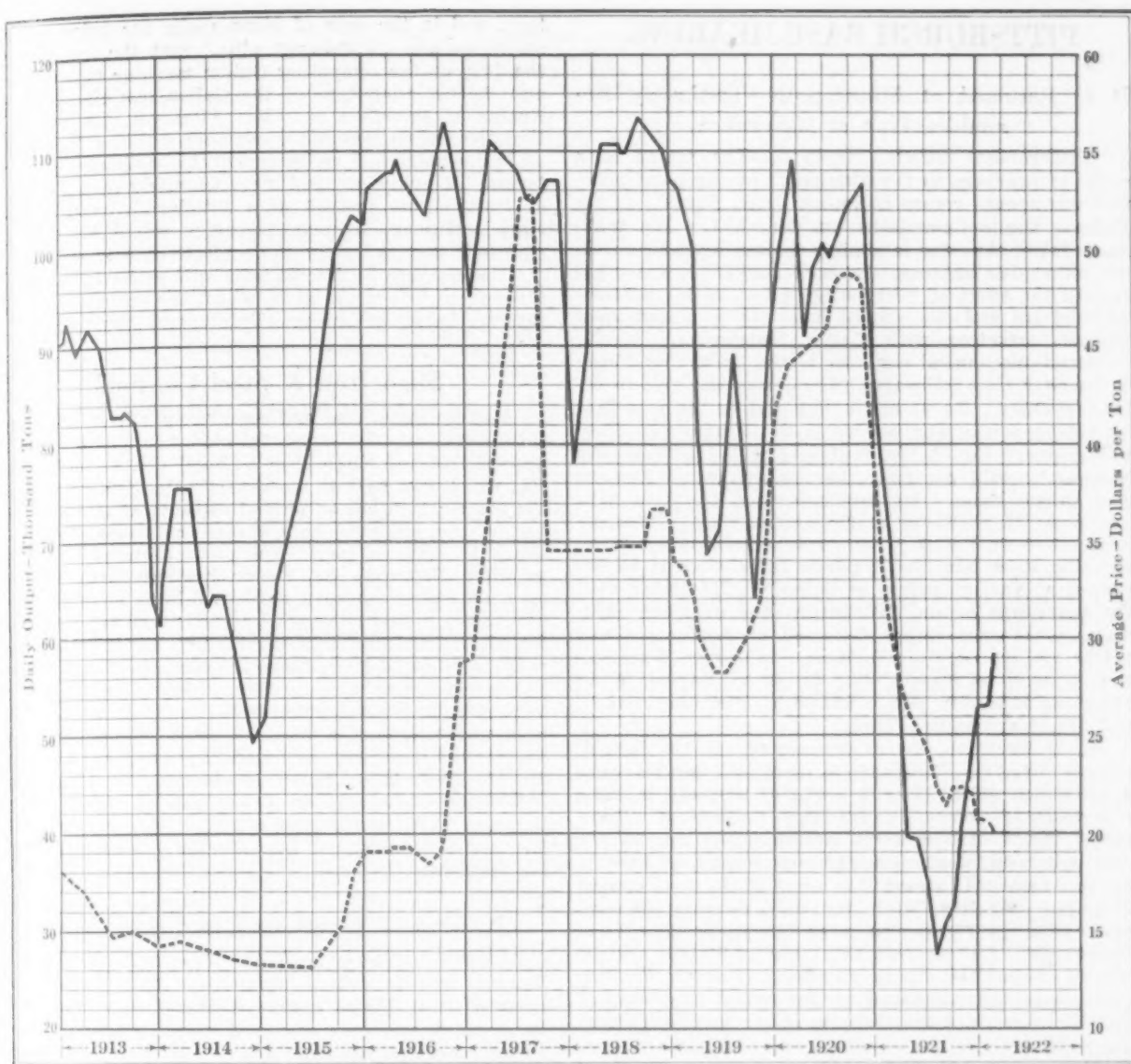
The following table shows the number of furnaces in blast March 1 in the different districts and their capacity, also the number and daily capacity in gross tons of furnaces in blast Feb. 1:

Coke and Anthracite Furnaces in Blast

Location of Furnaces	Total Stacks	March 1 In Blast	Capacity per Day	Feb. 1 In Blast	Capacity per Day
New York:					
Buffalo	22	9	3,750	8	3,300
Other New York...	4	0	....	1	220
New Jersey	4	1	140	1	150
Pennsylvania:					
Lehigh Valley	18	3	1,000	4	1,010
Spiegel	2	0	....	0	....
Schuylkill Valley...	15	5	1,725	4	1,360
Lower Susquehanna.	10	1	440	1	400
Lebanon Valley	8	2	410	2	430
Ferro and spiegel..	2	1	80	1	80
Pittsburgh District..	55	30	14,000	27	12,500
Ferro and spiegel..	4	2	225	1	140
Shenango Valley ...	19	4	1,820	5	2,230
West. Pennsylvania..	26	7	2,440	4	1,465
Maryland	6	1	475	1	435
Wheeling District ...	15	5	2,490	5	2,430
Ohio:					
Mahoning Valley ...	28	12	6,000	13	6,330
Central and Northern	26	14	6,100	12	5,250
Southern	16	3	1,090	3	1,020
Illinois and Indiana...	42	19	10,200	17	9,270
Mich., Wis. and Minn..	11	3	1,200	2	540
Colorado and Missouri.	6	2	720	2	800
The South:					
Virginia	16	0	....	0	....
Kentucky	7	1	320	1	300
Alabama	41	12	4,415	10	3,615
Tenn., Ga. and Texas..	16	1	30	1	30
Total	419	138	59,080	126	53,305

Diagram of Pig Iron Production and Prices

The fluctuations in pig iron production from 1913 to the present time are shown in the accompanying chart. The figures represented by the heavy line are those of daily average production by months of coke and anthracite iron. The dotted curve on the chart represents monthly average prices of Southern No. 2 foundry pig iron at Cincinnati, local No. 2 foundry iron at furnaces in Chicago, and No. 2X at Philadelphia. They are based on the weekly quotations of THE IRON AGE.



The Full Line Represents the Daily Production of Pig Iron and the Dotted Line Is the Average of the Price Per Ton of No. 2 Southern Pig Iron at Cincinnati, Local No. 2 Iron at Chicago and No. 2X Iron at Philadelphia

Production of Coke and Anthracite Pig Iron in the United States by Months, Beginning Jan. 1, 1918—Gross Tons

	1918	1919	1920	1921	1922
Jan.	2,411,768	3,302,260	3,015,181	2,416,292	1,644,951
Feb.	2,319,299	2,940,168	2,978,879	1,937,257	1,629,991
Mar.	3,213,091	3,090,243	3,375,907	1,596,522	.....
Apr.	3,288,211	2,478,218	2,739,797	1,193,041	.....
May	3,446,412	2,108,056	2,985,682	1,221,221	.....
June	3,323,791	2,114,863	3,043,540	1,064,833	.....
July	3,420,988	2,428,541	3,067,043	864,555	.....
Aug.	3,389,585	2,743,388	3,147,402	954,193	.....
Sept.	3,418,270	2,487,965	3,129,323	985,529	.....
Oct.	3,486,941	1,863,558	3,292,597	1,246,676	.....
Nov.	3,354,074	2,392,350	2,934,908	1,415,481	.....
Dec.	3,433,617	2,633,268	2,703,855	1,649,086	.....
Tot. yr.	38,506,047	30,582,878	36,414,114	16,543,686	.....

*These totals do not include charcoal pig iron. The 1920 production of this iron was 323,396 tons.

Production of Steel Companies—Gross Tons

Returns from all furnaces of the United States Steel Corporation and the various independent steel

Production of Steel Companies—Gross Tons

	Total Production			Spiegeleisen and Ferromanganese		
	1920	1921	1922	1920	1921	1922
Jan.	2,222,455	1,932,159	1,306,045	23,957	22,228	6,874
Feb.	2,181,679	1,625,695	1,311,170	28,038	29,013	8,540
Mar.	2,480,668	1,323,443	.....	35,275	41,294	.....
Apr.	1,968,542	1,015,621	.....	27,628	24,310	.....
May	1,128,720	1,024,678	.....	33,407	9,232	.....
June	2,209,770	853,312	.....	34,751	4,536	.....
July	2,230,567	715,664	.....	36,789	5,524	.....
Aug.	2,254,943	807,144	.....	36,985	3,878	.....
Sept.	2,247,250	815,692	.....	39,546	3,289	.....
Oct.	2,393,644	1,034,312	.....	34,756	3,902	.....
Nov.	2,160,075	1,138,789	.....	26,944	3,525	.....
Dec.	2,047,167	1,276,381	.....	28,023	3,953	.....

companies, as well as from merchant furnaces producing ferromanganese and spiegeleisen, show the follow-

ing totals of steel making iron, month by month, together with ferromanganese and spiegeleisen. These last, while stated separately, are also included in the columns of "total production."

Large Furnace Output

The blast furnace of the Weirton Steel Co., Weirton, W. Va., on Feb. 25 produced 823 gross tons of pig iron, thus coming within a couple of tons of the record mark established a few years ago by No. 1 furnace of the Pittsburgh Steel Co., which made 825 gross tons of pig iron in one day. In both instances these yields were possible by the charging of a good deal of scrap. On the straight ore charge, the best record recently was made in the new furnace of the Trumbull-Cliffs Furnace Co., Warren, Ohio, which tapped 715 tons in one day. For the two weeks ended March 5, the 600-ton furnace of the Weirton Steel Co. averaged 723 tons.

The Hardinge Co., 120 Broadway, New York, has acquired the business of the Coal Washing Equipment Co., Pittsburgh. The Coal Washing Equipment Co. did not have its own factory, its equipment being made in other shops on a contract basis, but the Hardinge Co. will now manufacture this equipment in its own plant at York, Pa.

At the regular monthly meeting of the Detroit Chapter of the American Society for Steel Treating on Feb. 27, F. H. Helrigel, Motor Products Co., discussed heat treating as applied to sheet steel.

PITTSBURGH BASE HEARING

It Is Resumed at Minneapolis—Testimony Resembles That at Milwaukee

MINNEAPOLIS, MINN., March 6.—The second of a series of hearings on the Pittsburgh basing point practice was opened before Examiner J. W. Bennett of the Federal Trade Commission on March 1. The testimony taken thus far is similar to that brought out in the Milwaukee hearing. In each case the witness explained the effect of "Pittsburgh plus" on his particular business and the alleged handicap it placed upon him in competing with Eastern companies. Melvin Ovestrud, mechanical engineer of the Twin City Forge & Foundry Co., Stillwater, Minn., was the first to offer testimony. He asserted that despite the fact that his company is closely related to the Minneapolis Steel & Machinery Co., it lost contracts with that company because it could not meet the competition of Eastern drop forge shops. In supplementing Mr. Ovestrud's testimony, H. E. White, traffic counsel for the Western Association of Rolled Steel Consumers, presented evidence to show how the Western forge shop is handicapped at various points of delivery. He stated that the advantage of the Pittsburgh shop over the Stillwater plant on forgings delivered at destination was \$11.30 per ton at Duluth, Minn.; \$12.20 at Waterloo, Iowa; \$16.30 at Peoria, Ill.; \$16.60 at Racine, Wis.; \$14.80 at Janesville, Wis.; \$21.60 at Muskegon, Mich., and \$18.90 at Cadillac, Mich.

E. J. Ellertson, assistant secretary of the Russell Grader Mfg. Co., Minneapolis, testified that his company, which did \$2,000,000 worth of business in 1921, was under a severe disadvantage because of "Pittsburgh plus." The graders manufactured are 75 per cent steel, some graders containing as much as 5200 lb. of steel each. He stated that some of the steel bought came from Steelton, Minn., but until recently the company paid the freight on it as though it came from Pittsburgh. He asserted that this additional freight charge blocked the company's efforts to obtain Eastern business and handicapped it throughout the country. Mr. White testified that because of the Pittsburgh basing point practice the company was at a disadvantage of 47c. on each 100 lb. in bidding against a Cleveland manufacturer at Chicago, 43c. at Milwaukee, 20½c. at Des Moines, Iowa; 17½c. at Omaha, and 12½c. at Duluth.

H. C. Baldry, vice-president of the Flour City Ornamental Iron Co., Minneapolis, declared in his testimony that the company's fence plant had been closed in 1912 because of the handicap of "Pittsburgh plus." He asserted that at one time as many as 300 men were employed in this department of his company, but that Cleveland and Cincinnati competitors had such an advantage because of a "fictitious and excessive" freight charge that the company had to discontinue the manufacture of the product.

G. A. Stockland, secretary of the Stockland Road Machinery Co., Minneapolis, declared that the increased manufacturing cost in the "Giant" type of Stockland grader attributable to "Pittsburgh plus" was \$24.73. He asserted that Eastern competitors were able to maintain warehouses in Minneapolis and compete on even terms notwithstanding the great distance they had to ship their finished products. On shipments to Canada, Mr. Stockland said, Minneapolis manufacturers paid a double duty. This point was brought out in greater detail in testimony by Mr. Ellertson, who used a Galion, Ohio, manufacturer of road machinery, and the Russell Grader Mfg. Co. as examples. The rate from Pittsburgh to Galion, he said, is 28c. per 100 lb., and the rate from Galion to Regina, Sask., is \$1.63½c., making a total freight charge to the Galion manufacturer of \$1.91½c. The freight from Pittsburgh to Minneapolis is 66c. and from Minneapolis to Regina \$1.01½c., making a total of \$1.67½c. It seems apparent, he asserted, that Minneapolis enjoys a differential of 24c. per 100 lb. over its Galion competitor, but such is not the case. The Canadian duty is based on the price of the machine f.o.b. fac-

tory, and in the case of Minneapolis the price necessarily includes "Pittsburgh plus," with the result that the duty on the competing Galion machine is 30c. less, and the net advantage of the Galion manufacturer in Regina is therefore 6c. Mr. Ellertson also testified that the Galion competitor can ship within a few miles of Minneapolis and compete with his company on even terms. If prices on steel were definitely on a Chicago or Duluth base instead of a Pittsburgh base, he declared, Minneapolis manufacturers would be able to ship half way to Galion and compete on even terms.

The hearing at Minneapolis will probably continue throughout this week, after which the commission will take testimony in Chicago, Duluth and Birmingham.

Sligo Iron & Steel Co. Sold

Max Solomon, iron and steel scrap, Oliver Building, Pittsburgh, was the successful bidder for the plant and property of the Sligo Iron & Steel Co., Connellsville, Pa., which was sold at a trustees' sale, Feb. 8. Beside the plant, which has an annual capacity of about 70,000 tons of iron and steel bars, plates and sheets, there are about 15 acres of land. The plant contains 19 single puddling furnaces, six 4-door heating furnaces, one open annealing furnace; a 20-in. 3-high, 2-stand muck bar mills, a 16-in. 3-high 1-stand roughing, a 16-in., 3-high, 1-stand and a 16-in., 2-high, 1-stand finishing mills, a 16-in., 2-high, 1-stand bullhead, 12-in., 3-high, 1-stand roughing mill, a 9-in., 3-high, 3-stand and a 9-in., 2-high, 1-stand guide mills, a 24-in. x 66-in., 2-high roughing and a 24-in. x 60-in. 3-high finishing plate mills, one drop hammer, one shingling hammer and two forge fires. Rated annual capacity of the plant is 7000 tons of muck bar, 40,000 tons of iron and steel bars and 24,000 tons of plates and sheets. Mr. Solomon has not yet announced his intentions with regard to his purchase.

New Steel Warehouse in Philadelphia

A new steel warehouse will be opened at Third and Venango streets, Philadelphia, about April 1 under the name of R. B. Fritch & Co. R. B. Fritch is president, W. F. Hays, treasurer, and A. T. Green, secretary. Mr. Fritch was purchasing agent for 16 years with R. D. Wood & Co., and treasurer of Southwark Foundry & Machine Co., Philadelphia, until he formed the Provident Engineering Co., the interest which he is relinquishing to form the new company. The company will stock merchant bars and shapes, sheets, wire and in addition carry foundry supplies. The new warehouse will be well equipped as to shipping facilities, having a railroad siding. It is the intention to maintain trucks for local delivery.

An excellent opportunity for American manufacturers of agricultural machinery to introduce their equipment in Ireland will be afforded by the annual Agricultural Spring Show of the Royal Dublin Society, to be held at Ballsbridge, Dublin, on May 16-18, according to a letter received by the Agricultural Implement Division of the Department of Commerce from Joseph Connolly, Irish trade commissioner to the United States. This show is attended by practically all those who are interested in agriculture in Ireland, and it is believed that substantial sales of American implements and machinery will follow if these products are on display. Allocation of sites for exhibits will be made soon. Interested American manufacturers should apply promptly to the secretaries of the Royal Dublin Society, Dame Street, Dublin, Ireland.

Work of rebuilding the plant of the Standard Slag Co., Youngstown, Ohio, at the blast furnace in Sharpsville, Pa., of the Shenango Furnace Co., was started last week. It will replace the old plant destroyed several months ago by fire, and will be larger in capacity, having two bins instead of one. The main building will be of steel construction. Additional equipment and slag crushing machinery will be installed, furnished by the Allis-Chalmers Mfg. Co.

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ESTABLISHED 1855

THE IRON AGE

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A Good Tin Plate Year

It is well established now that 1922 will be a good tin plate year, possibly even a record year. It is not sufficient explanation of the conditions to say that tin plate is an article of common everyday consumption by the great mass of the people and is therefore not subject to ups and downs. There is more in the matter than that. Thirty years ago, when the production of tin plate in the United States really began, the material was also an article of everyday consumption. There were heavy imports from Wales and the average price over a period of years had not been unreasonably high. Our annual consumption then was about ten pounds per capita, while lately it has been running over twenty-five pounds. The production in a good year is from four to five times the imports of thirty years and more ago, for in addition to the increase in per capita consumption the population has grown and we now export tin plate. We exported as much tin plate in 1918 as we imported in 1886, when we were drawing all our supplies from abroad.

There are several reasons for the growth in tin plate consumption. Of course it is an advantage to have the sources of production within our own borders, instead of depending on imports, but it is a fact that the country was well served, in the matter of deliveries, when it was depending upon South Wales. Prices were fairly steady and the "Big Four" New York importing houses (Phelps, Dodge & Co.; Bruce & Cook; Dickerson, Van Dusen & Co., and Robert Crooks & Co.) maintained stocks that could readily be drawn upon.

The next argument commonly adduced is that methods of sterilizing food products have been so improved that there is a much wider demand. The improvements are not denied, but the foods prepared in tin plate containers a quarter century and more ago were pretty good, nevertheless. Another argument is that machinery for making containers has been greatly improved, whereby the cost is lessened. That also is true, but tin cans were rather cheap even thirty years ago.

The greatest influence in increasing the consumption of tin plate is the large development in its use in packing articles other than the fa-

miliar food products of twenty and thirty and more years ago. The time was when the chief employment of tin plate was in "the canning crops," but that is no longer the case. Tin plate is one of the modern conveniences. People buy articles in tin plate containers that do not have to be so packed, but which are much more attractive when so prepared.

Tin plate production first exceeded a half million gross tons in 1906, while it was in 1915 that the million-ton level was reached. Since then the output has not fallen as low as a million tons, with the probable exception of last year, the official report for which will perhaps show about 900,000 tons. That was a year of liquidation of stocks of goods prepared in tin plate containers and of restricted consumption on account of the persistence of high prices at retail for the prepared articles. The record year was 1917, with an output of 1,512,146 gross tons.

In the first two months of this year production of tin plate was between 225,000 and 250,000 tons, or almost one-sixth of the record annual production. Since it is not usual for the mills to run at their full rate at that time of year, the augury for a heavy year's production is excellent, and there is also the factor that the relation of mill shipments to production was high in the two months. The chief hindrance to a record production this year is the relative lightness of exports of tin plate and of oil in tin plate containers. This handicap may disappear, while heavy domestic consumption is certain.

In the ups and downs of the foreign trade of Great Britain, the rôle of pig iron is conspicuous. An analysis of the official data for 1913, 1920 and 1921 shows that whereas British exports of pig iron were approximately 22 per cent of the total iron and steel exports in 1913, by 1920 they had fallen to 18 per cent and by 1921 to only 8 per cent. As to imports the comparison is still more striking: In 1913 imports of pig iron into Great Britain were only 10 per cent, in 1920 they were 21 per cent, but in 1921 the percentage was no less than 41. Before the war Great Britain was the chief exporter of pig iron. The coal strike early in

1921 was largely responsible for the reversal in pig iron movements. Meanwhile no one may venture to suggest how readily or rapidly the 1913 ratios may again be reached.

Steel and Commodity Prices

With the additional declines that have occurred in finished steel prices in the past fortnight the average price, according to THE IRON AGE composite, stands at 120, using the average in 1913 as 100, according to the practice of the Bureau of Labor with its index number representing commodities in general. The bureau's index, which is of prices at wholesale, was 148 for January and has shown scarcely any change for more than six months.

It is admitted that steel manufacturers are not making money, but they are presumably getting a new dollar for an old, and perhaps are earning something against their overhead. No doubt, on the average, the mills are not getting their full cost in their present selling prices, i.e., they are losing part or all of their overhead expense.

If steel were not being made very economically, conditions would be still worse. There are the handicaps of a low operating rate, which unavoidably greatly increases unit cost, together with wages, freight rates and taxes at much higher levels than before the war. Any guess at steel mill costs and selling prices based upon the known conditions would be at a higher level than is actually shown. The necessary inference is that the steel industry is making efficient use of its facilities, apart from the known handicaps.

The industry has made great progress in recovering from the conditions imposed by the war and the soft labor times of 1920. This, however, is no new showing for the steel industry. Since the outset the industry has been increasing in efficiency, whereby it has balanced many handicaps that have arisen, such, for instance, as the decreasing iron content of the ores available, as compared with the Lake Superior ores used in the eighteen-nineties.

It may be of interest to recall that on Aug. 24, 1911, THE IRON AGE published an editorial making a comparison somewhat similar to the one made above. The index numbers of the Bureau of Labor and Bradstreet were quoted, showing that at that time steel prices were lower, relative to commodity prices, than in 1906-7 or the period of very low prices in 1897. The comparison between prices in 1897 and prices in 1911 showed an increase of 30 per cent for steel, and increases for commodities in general of 40 per cent according to Bradstreet and 46 per cent according to the Bureau of Labor.

The steel industry cannot control all its costs. It cannot make fuel costs, freight rates or tax rates; but the things it cannot control are things that producers of other commodities cannot control either. Apparently the industry will still be able to make a good showing, in economy and efficiency, by comparison with industries in general. There is no danger that the use of steel

will be restricted at any point on account of the price comparing unfavorably with prices of other commodities. Rather, steel is likely to forge ahead and develop new uses. To-day a given quantity of commodities will buy more steel than in 1911 and in 1911 it would buy more than in 1897. That is an achievement. We do not make progress in everything. Who will assert that mail service, for instance, is notably better than ten years or twenty-five years ago? There are industries that are not rendering nearly so good service as they used to render, while steel is doing much better.

An Advance in Magnetic Testing

Magnetic testing has now been applied for determining the efficacy of case hardening. More than that, it has been applied in a practical way that suggests broad possibilities. Announcement of the development was made at the meeting last week to discuss steel treating problems and covered the perfection of an apparatus used for testing the case hardness of small chain. Briefly, by empirically determining the maximum and minimum depths of case in chain corresponding to poor results, an approximate standard is established by which it is possible to determine magnetically the depth of case which will give the longest life for definite conditions. This has already afforded a test basis which is being applied commercially.

This principle may, in the not distant future, be applied to other properties of steel. The designers of the apparatus are making just such predictions and assert that it will be possible to correlate the tensile strength or ductility as easily by magnetic tests as the case hardness of steel. All that appears necessary is the determination of maximum and minimum limits within which the material will be satisfactory and use these for the fixing of a standard. There are those who do not appreciate that this is really the principle on which most specifications are now based. New apparatus will not be needed, it is claimed. The application of the magnetic testing idea to case-hardened chain is after all merely a step in the development of non-destructive testing for which there has long been a demand.

What of the Size of Factories

Consolidations of several small plants into one large one and of large ones into still larger have been reflected from time to time in the census returns of manufactures. This tendency toward larger manufacturing units has been brought out afresh by the census figures for 1919, some of which have now become available. The total number of manufacturing establishments is given as 290,105, with 9,096,372 wage earners. The average number of wage earners per establishment works out at 31.4, as compared with 25.5 in 1914 and 24.6 in 1909.

As might be expected, the great bulk of employees are to be found in the larger plants. It happens, however, that the number of these larger

plants has also proportionately increased. Thus, those plants employing more than 50 wage earners, which numbered only 8.9 per cent of the total in 1909 and 1914, have now gone up to 9.95 per cent. And the number of wage earners employed in such plants has increased from 74 per cent of the total in 1909 to 76.3 per cent in 1914 and 80.5 per cent in 1919.

This fact is brought out more strikingly when we consider that, in 1919, the number of employees in plants employing more than 50 was 2.85 times the number in smaller plants; in 1914 the number in the larger plants was 3.22 times those in the smaller plants; in 1919 the number in the larger plants was 4.13 times the number in the smaller plants. This general tendency seems to be especially concentrated in the still larger plants, for it is found that the number of employees in plants having more than 500 wage earners has practically doubled between 1909 and 1919, while the number in plants having less than 500 employees has gained only 15 per cent and the number in plants having no more than 50 employees has gained only 3.3 per cent in the ten years.

It may be pointed out, as a matter of particular interest to the steel industry, that there are more of the largest plants—those having over 1000 wage earners each—in Pennsylvania than in any other State. The number of such plants is 142 in Pennsylvania, with 368,002 employees; Massachusetts stands second with 118 plants and 244,045 employees; New York is third with 106 plants and 226,236 employees. Both Michigan and Ohio have more than 200,000 employees in such plants, while New Jersey and Illinois, with about 171,000 men each, occupy sixth and seventh places respectively. This seventh position for Illinois appears surprising, in view of the number of large plants in and about Chicago, and particularly in view of the importance of Chicago from the iron and steel standpoint, based upon the location there of such big units as the Illinois Steel Co., the International Harvester Corporation, the Inland Steel Co. and the Steel & Tube Co. of America.

That the tendency is still toward large concentration of manufacturing capacity does not follow. A belief is growing that more account must be taken hereafter in industrial undertakings of the human element. The modern factory has done well to make conditions pleasant for the employee, but it has not done as much for his open-air living in the hours out of the factory. It is saying nothing new to emphasize that the more diversified the industries in a given community, the less likelihood of labor disturbances through such causes as idleness in any one industry. The flattening of the curve of unemployment is a result, and there is a better feeling the year 'round in the community as a whole.

If there is much in the contention of industrial students that the pendulum is now swinging in the direction of decentralization, it seems reasonable to believe that new enterprises and the amalgamations which are forming out of the present stress will consider locating in the small rather than the large cities. There seems to be a size of town below which the feeling prevails that opportunities do not exist in such number as to

encourage the ambitious to remain. The larger the city the wider is the natural belief in chances for benefit, but a realization of the congestion growing out of the massing of large plants in overcrowded centers may put the smaller center in a new light. The gradual building of large power stations, as proposed by the super-power project for the East, the tying of these and water power developments together, and the improvement of our highways with the realignment of transportation are among the factors which are calculated to influence the decentralization movement, but most of all it will probably come as the result of a definite program of industrial engineers and promoters and from the appreciation on the part of the wage earner that self-advancement may actually be attained, without sustaining the high cost and unsatisfactory conditions of living in the largest cities. Owing to the costs involved, decentralization of existing plants would naturally proceed slowly, but so far as the workers are concerned, any movement away from largest centers will come largely as the result of appreciation of what life means in its broadest terms.

CORRESPONDENCE

Verses Relating to Sciences

To the Editor: I am making a collection of verses, whose subject matter relates to the sciences, or to their co-related branches of engineering, with the intention of publishing at some future date an anthology of such verse. It has occurred to me that there may be among your readers many who have verses of this character in their possession, and who would be willing to contribute them to this collection. Will you kindly grant me space for this appeal to your readers to send to me copies of such verses, together with the necessary details of authorship, place of publication (if previously published) at my address Box 130, Massachusetts Institute of Technology, Cambridge, Mass.? Such verses sent to me will be greatly appreciated and duly acknowledged.

CHARLES E. RUBY.

Steel Electrical Engineers to Meet

Approaching meetings of the Association of Iron and Steel Electrical Engineers include the following:

March 13, Cleveland: "Protective Relays for Generators and Transmission Lines."

March 15, Chicago: "Plant of Acme Steel Goods Co."

March 18, Pittsburgh: "Synchronous Motors in Mines and Steel Mills."

March 25, Birmingham: "Lubrication of Mill Motors" and "Electric Power Distribution in Steel Industry." At Youngstown: "Bent Tube vs. Straight Tube Boilers."

Sale of Winnisimmet Ship Yard, Inc.

The plant of the Winnisimmet Ship Yard, Inc., Chelsea, Mass., has been sold. The real estate and the marine railway and the marine railway equipment were purchased by H. F. Winslow of 30 State Street, Boston, for \$200,000—plus \$52,452 of unpaid taxes; and 1692 lots of personal property realized \$55,684, hence the total sale amounted to \$308,136. The attendance at the sale was an unusually representative business one and of size. It came from all parts of the country and Canada.

FEBRUARY INGOT OUTPUT

Increase Over January 9.33 Per Cent — Yearly Rate Nearly 27,000,000 Tons

The steel ingot statistics of the American Iron and Steel Institute show that 30 companies which in 1920 produced 84.20 per cent of the total, had an output in February of 1,742,345 gross tons as compared with 1,593,482 tons in January. The increase in February over January was 148,863 tons or 9.33 per cent. This contrasts with an increase in January over December of 166,389 tons, or 11.6 per cent. Estimating the production of other companies on the basis of the 30 companies (though it is probable the small companies did not equal the rate of the larger ones), the total output of ingots in February was 2,069,292 tons or 86,220 tons per day, counting 24 working days for February. The January output on the same basis was 75,700 tons per day, which makes the February output a gain of 10,520 tons per day.

In the table below, the output of Bessemer and open-hearth works is separated and the figures for 1920 by months are included:

Monthly Production of Steel Ingots by 30 Companies Which Produced About 84.20 Per Cent of Total in 1920—Gross Tons

	Open Hearth	Bessemer	All Other	Total
January, 1920 ..	2,242,758	714,657	10,687	2,968,102
February	2,152,106	700,151	12,867	2,865,124
March	2,487,245	795,164	16,640	3,299,049
April	2,056,336	568,952	13,017	2,638,305
May	2,251,544	615,932	15,688	2,883,164
June	2,287,273	675,954	17,463	2,980,690
July	2,135,633	653,888	13,297	2,802,818
August	2,299,645	695,003	5,784	3,000,432
September	2,300,417	693,586	5,548	2,999,551
October	2,335,863	676,634	3,485	3,015,982
November	1,961,861	673,215	3,594	2,638,670
December	1,687,162	649,617	3,586	2,340,365
Total, 1920 ..	26,197,843	8,112,753	121,656	34,432,252
January, 1921 ..	1,591,281	608,276	3,629	2,203,186
February	1,295,863	450,818	2,796	1,749,477
March	1,175,591	392,983	2,404	1,570,978
April	1,000,053	211,755	2,150	1,213,958
May	1,047,810	216,497	1,543	1,265,850
June	808,286	193,644	1,476	1,003,406
July	689,489	113,312	575	803,376
August	915,334	221,116	1,621	1,138,071
September	908,381	265,152	1,207	1,174,740
October	1,269,945	345,837	1,028	1,616,810
November	1,294,371	363,912	1,718	1,660,001
December	1,129,174	296,380	1,539	1,427,093
Total, 1921 ..	13,125,578	3,679,682	21,686	16,826,946
January, 1922 ..	1,260,809	331,851	822	1,593,482
February	1,393,158	348,571	616	1,742,345

The February ingot production was at yearly rate of 26,814,420 tons, counting 311 operating days to the year. This compares with a rate in January of 23,542,500 tons and with 11,857,186 tons in July, the low point for 1921.

The increase of 10,520 tons per day in the ingot output of all companies reporting in February over January contrasts with an increase of 5151 tons per day in the February pig iron output over January.

March Meetings of Mechanical Engineers

Among meetings scheduled for March by various sections of the American Society of Mechanical Engineers may be mentioned the following:

March 10—Newark, N. J., "Die Castings." Joint meeting with Society of Automotive Engineers. Providence, R. I., Society rooms, Leo Loeb, Day & Zimmerman, Philadelphia, "Heat Balance in Power Plants." Richmond, Va., Murphy's Hotel, E. J. Willis, "History of Steam Power"; H. G. Johnson, "Gas Manufacture and Distribution"; H. D. Savage, "Pulverized Fuel"; W. A. Ludwick, "Coal Tar By-Products" and "Lubrication."

March 13—Boston; joint meeting with students of technical schools. Major W. E. Hoke, "Precision in Machine Tool Work."

March 14—Hartford, Conn., Hartford Electric Light Co., "Conveyors," by a representative the Lamson Co.; "Furnace Combustion," by a representative of the Sanford Riley Stoker Co.; both illustrated.

March 16—Meriden, Conn., "Leather—Its Uses in Industrial Plants."

March 17—Chicago, Charles Piez, "The Landis Award." Philadelphia, Towne Scientific School, W. L. Saunders, "Forty-Six Years Out of College." Afternoon inspection Delaware plant Philadelphia Electric Co. Film from Sanford Riley Stoker Co., showing combustion in a boiler furnace.

March 20—New Haven, Conn., Taft Hotel, "Human Element in Industry," President Dexter S. Kimball in the chair. J. J. Callahan, "Heart Power"; J. E. Bennett, "How Poor."

March 21—Detroit; joint meeting with Affiliated Technical Societies of Detroit. Philadelphia, Engineers' Club, joint meeting with A. I. E. E. and A. S. C. E. Hydro-electric symposium with special reference to Chippewa-Queenston (Ontario) development. Atlanta, Carnegie Library, R. V. Wright, speaker.

COMING MEETINGS

March

National Association of Waste Material Dealers. March 14 and 15. Annual meeting, Hotel Astor, New York. Secretary, Charles M. Haskins, Times Building, New York.

Refractories Manufacturers' Association. March 15, 16 and 17. Annual meeting, Chicago. Secretary, F. W. Donahoe.

Taylor Society. March 16 to 18. Midwinter meeting, City Club, Philadelphia. Managing director, Dr. H. S. Person, 29 West Thirty-ninth Street, New York.

April

National Federation of Construction Industries. April 3, 4 and 5. National conference, Drake Hotel, Chicago. Association headquarters, Drexel Building, Philadelphia.

National Metal Trades Association. April 19 and 20. Annual meeting, Hotel Astor, New York. Secretary, Louis W. Fischer, Peoples Gas Building, Chicago.

American Gear Manufacturers' Association. April 20, 21 and 22. Annual meeting, Hotel Lafayette, Buffalo. Secretary, F. D. Hamlin, Earle Gear & Machine Co., Philadelphia.

American Supply and Machinery Manufacturers' Association and Southern Supply & Machinery Dealers' Association. Joint Meeting, April 24 to 26, Birmingham. F. D. Mitchell, 233 Broadway, New York, is secretary of the American association and A. M. Smith, Smith-Courtney Co., Richmond, Va., is secretary of the Southern association.

Society of Industrial Engineers. April 26 to 28. Spring meeting, Hotel Statler, Detroit. George C. Dent, business manager, 327 S. La Salle Street, Chicago.

American Electrochemical Society. April 27 to 29. Spring meeting, Baltimore. Acting secretary, Dr. Colin G. Fink, 110 Park Avenue, New York.

May

Iron and Steel Institute. May 4 and 5. Annual Meeting. Quarters of Institution of Civil Engineers, London, England. Secretary, George C. Lloyd, 28 Victoria Street, S. W., London.

The National Supply and Machinery Dealers' Association. May 8, 9 and 10. Seventeenth annual convention, Marlborough-Blenheim Hotel, Atlantic City. Secretary, T. James Fernley, 505 Arch Street, Philadelphia.

American Society of Mechanical Engineers. May 8 to 10. Spring meeting, Atlanta, Ga. Secretary, Calvin W. Rice, 29 West Thirty-ninth Street, New York.

National Association of Manufacturers. May 8, 9, and 10. Annual Convention, Waldorf-Astoria Hotel, New York. General Offices, 50 Church Street, New York.

National Foreign Trade Council. May 10 to 12. Convention, Philadelphia. Secretary, O. K. Davis, 1 Hanover Square, New York.

National Sheet Metal Contractors' Association. May 15 to 19. Convention and exposition, Cadle Tabernacle, Indianapolis.

National Association of Purchasing Agents. May 15 to 20. Annual convention and exposition. Exposition Park, Rochester, N. Y. Secretary, H. R. Heydon, 19 Park Place, New York.

American Iron, Steel & Heavy Hardware Association. May 23 to 25. Annual meeting, Hotel Washington, Washington. Secretary, A. H. Chamberlain, Marbridge Building, New York.

American Society for Steel Treating. May 25 and 26. Sectional meeting, Pittsburgh. Secretary, W. H. Eisenman, 4600 Prospect Avenue, Cleveland.

Iron and Steel Markets

FOCUSING ON PRICES

Attempts to Stabilize on Higher Levels

Operations Steady—February Iron and Steel Production at 35 Per Cent Above 1921 Rates

Definite efforts are now being made to stiffen steel prices. In a market still strongly in buyers' hands and not many mills with more than a month's business ahead, the leading Pittsburgh independent, which in recent weeks made a drive for current business, announced late on Monday a return to a basis of 1.50c., Pittsburgh, for plates, shapes and bars. The immediate effect has been to make buying at 1.35c. difficult and to focus on 1.40c. as a minimum for the heavy tonnage products.

The action, so far as it may now be gaged, has accentuated the disinclination of mills to consider forward buying at to-day's prices. It follows the refusal of several steel bar makers to take less than 1.40c., and on May 7 the leading Chicago independent put its heavy tonnage items up \$2 a ton.

Attempts to break through wire and sheet prices have proved unsuccessful. Some sheet makers are now selling the heavier blue annealed sheets on the straight sheet basis instead of the plate basis, as was the case in meeting competition with plate makers.

The first week of March has shown no general increase in operations. The Carnegie Steel Co. is to blow in another blast furnace next week, and one each will go in for the Republic and the Cambria companies for their Bessemer plants. Chicago remains a notably active center. The Illinois Steel Co. increased ingot production in the week from 55 to 63½ per cent.

No concern is shown over the impending coal strike. A substantial gain in bookings of wire products is credited to the recent stabilization of prices. In fuel, buying has been of an ordinary character, and prices are not much more than 25c. or 30c. above the low bases of January.

February pig iron production was 1,629,991 tons, or 58,214 tons per day. January's total for the 31 days was 1,644,951 tons, or 53,063 tons daily. Of the total daily increase of output of February over January, namely, 5151 tons, 4697 tons or over 90 per cent represented the gain of steel making furnaces.

On March 1 there were 138 furnaces in blast, operating at a rate of 59,080 tons per day, against 126 furnaces active on Feb. 1, at a daily capacity of 53,305 tons. A total of 17 furnaces was blown in, five of these merchant furnaces, and five went out of blast in the month, of which two were merchant furnaces.

The production of steel ingots for February, on a basis of the compilations of the American Iron and Steel Institute, indicates a total of 86,220 tons per day against 75,700 tons per day in January. The February rate was 26,800,000 tons per year, which is 35 per cent above the actual production of 1921 and the February rate of pig iron making, 22,250,000 tons, is likewise 35 per cent above the output of last year.

Buying of pig iron in the East has continued. In the New York district orders for about 20,000 tons of various grades were placed. Eastern Pennsylvania furnaces pretty generally have advanced prices and the market is firmer, but concessions are still made. At Chicago the withdrawal from the market of the steel works furnace which had been an active seller has had a steadying influence. In the South, the general selling price has receded 50c. to a basis of \$15, Birmingham. Stocks of Alabama pig iron declined from 157,000 tons Feb. 1 to 134,000 tons March 1.

THE IRON AGE composite pig iron price is now \$18.25 per gross ton against \$18.10 a week ago.

Competition in fabricated steel lines remains keen. On the 23,000 tons for the New York Central's bridge across the Hudson River, the notably low bid of \$68.60 per ton, fabricated and erected, was received. Upward of 15,000 tons of steel structures was put under contract, including tanks involving chiefly plates. New work totals about 16,000 tons, including a 6000-ton bridge for the Northern Pacific.

Little fresh railroad equipment work appeared. The Chicago & Northwestern is inquiring for 2750 cars, the Norfolk & Western for 2000 to 4000 70-ton steel cars and the Monon for 20 locomotives. In rails, 5000 tons for the Buffalo, Rochester & Pittsburgh was placed with a Buffalo mill.

Automobile makers of Detroit are operating at 55 to 75 per cent of capacity. An inquiry has come from that center for 2000 tons of sheets.

The agricultural implement makers have been heard from chiefly for orders to round out stocks in preparation for production.

Pittsburgh

PITTSBURGH, March 7.

The most interesting development of the week is the announcement of the Jones & Laughlin Steel Co., issued late yesterday afternoon, restoring the quotation of the early part of the year of 1.50c. on bars, plates and shapes. Officials of the company state that practically all lower quotations which have been out against these products have been withdrawn, and that 1.50c. now is the price either on old inquiries or new ones. The Carnegie Steel Co. has made no announcement yet of a change either in its prices or its sales policy and while it is possible that this company as well as the other independent companies may follow the advance, no definite developments yet have taken place other than that a Buffalo steel maker is reported to have withdrawn all outstanding quotations on hot rolled steel. Plates, shapes and bars at recent selling prices not only were considerably below producing costs but also well below the 10 year pre-war average. The move to put prices up, therefore, may be looked upon as an effort to reduce losses, and to bring these products more nearly in alignment with the prices of other lines of finished steel. The price has not been in effect long enough nor are a sufficient number of makers quoting this figure to give it standing as a quotation. Such business as has been done lately in plates, shapes and bars has in but few instances been at above 1.35c., Pittsburgh.

Betterment in steel business is well sustained and while there still is considerable doubt that the present upswing in the demand will prove long lived, it is a fact

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Mar. 7, 1922	Feb. 28, 1922	Feb. 7, 1922	Mar. 8, 1921
No. 2X, Philadelphia...	\$21.20	\$20.34	\$21.34	\$27.84
No. 2 Valley furnace...	19.00	19.00	19.00	26.00
No. 2 Southern, Cin'tif...	19.50	20.00	20.00	29.50
No. 2 Birmingham, Ala.†	15.00	15.50	15.50	25.00
No. 2 foundry, Chicago*	20.00	19.50	18.50	26.00
Basic, del'd, eastern Pa...	19.84	19.84	19.84	27.26
Basic, Valley furnace...	17.75	17.75	17.75	25.00
Bessemer, Pittsburgh...	<i>20.96</i>	21.46	21.46	28.93
Malleable, Chicago*	20.00	20.00	18.50	26.50
Malleable, Valley...	19.00	19.00	19.00	26.00
Gray forge, Pittsburgh...	20.71	20.71	20.96	26.96
L. S. charcoal, Chicago...	26.00	26.00	30.50	38.50
Ferromanganese, seaboard	62.50	62.50	58.35	90.00

Rails, Billets, etc., Per Gross Ton:

	Cents	Cents	Cents	Cents
O-h, rails, heavy, at mill	\$40.00	\$40.00	\$40.00	\$47.00
Boss, billets, Pittsburgh...	28.00	28.00	28.00	38.50
O-h, billets, Pittsburgh...	28.00	28.00	28.00	38.50
O-h, sheet bars, P'gh...	29.00	29.00	29.00	40.00
Forging billets, base, P'gh	32.00	32.00	32.00	43.50
O-h, billets, Phila...	33.74	33.74	33.74	49.24
Wire rods, Pittsburgh...	36.00	36.00	36.00	52.00
Skelp, gr. steel, P'gh, lb...	1.40	1.40	1.50	2.35
Light rails at mill...	1.40	1.40	1.50	2.35

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia...	1.71	1.76	1.81	2.70
Iron bars, Chicago...	1.55	1.55	1.60	2.60
Steel bars, Pittsburgh...	1.35	1.35	1.40	2.00
Steel bars, Chicago...	1.50	1.50	1.55	2.38
Steel bars, New York...	1.73	1.73	1.78	2.38
Tank plates, Pittsburgh...	1.35	1.35	1.40	2.10
Tank plates, Chicago...	1.50	1.50	1.55	2.48
Tank plates, New York...	1.73	1.73	1.78	2.48
Beams, Pittsburgh...	1.35	1.35	1.40	2.10
Beams, Chicago...	1.50	1.50	1.55	2.48
Beams, New York...	1.73	1.73	1.78	2.48
Steel hoops, Pittsburgh...	1.80	1.80	1.90	2.80

*The average switching charge for delivery to foundries in the Chicago district is 70c. per ton.
†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Sheets, Nails and Wire,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh	3.00	3.00	3.00	3.85
Sheets, galv., No. 28, P'gh	4.00	4.00	4.00	5.00
Sheets, blue an'l'd, 9 & 10	2.25	2.25	2.25	3.00
Wire nails, Pittsburgh...	2.40	2.40	2.40	3.00
Plain wire, Pittsburgh...	2.25	2.25	2.25	3.00
Barbed wire, galv., P'gh...	3.05	3.05	3.15	3.85
Tin plate, 100-lb. box, P'gh	\$4.60	\$4.60	\$4.75	\$7.00

Old Material, Per Gross Ton:

	Cents	Cents	Cents	Cents
Carwheels, Chicago...	\$15.50	\$15.00	\$15.00	\$17.00
Carwheels, Philadelphia...	16.00	16.50	16.50	18.00
Heavy steel scrap, P'gh...	15.00	15.00	13.50	14.00
Heavy steel scrap, Phila...	12.00	12.00	12.00	13.00
Heavy steel scrap, Ch'go...	11.75	11.50	11.25	13.00
No. 1 cast, Pittsburgh...	15.75	16.00	16.00	22.00
No. 1 cast, Philadelphia...	17.00	16.50	16.50	19.00
No. 1 cast, Ch'go (net ton)	13.75	13.50	13.00	15.75
No. 1 RR. wrot, Phila...	15.00	15.00	14.50	17.00
No. 1 RR. wrot, Ch'go (net)	11.25	10.75	10.50	12.00

Coke, Connellsville, Per Net Ton at Oven:

	Cents	Cents	Cents	Cents
Furnace coke, prompt...	\$3.25	\$3.25	\$2.75	\$4.50
Foundry coke, prompt...	4.25	4.25	3.75	5.50

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York...	13.00	12.75	13.50	12.75
Electrolytic copper, refinery	12.75	12.50	13.25	12.25
Zinc, St. Louis...	4.62½	4.55	4.50	4.85
Zinc, New York...	4.97½	4.90	4.85	5.20
Lead, St. Louis...	4.40	4.40	4.40	4.00
Lead, New York...	4.70	4.70	4.70	4.00
Tin (Straits), New York...	29.00	29.75	32.00	28.00
Antimony (Asiatic), N. Y.	4.20	4.35	4.40	5.20

Composite Price, March 7, 1922, Finished Steel, 1.998c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets	Feb. 28, 1922, 1.998c. Feb. 7, 1922, 2.019c. Mar. 8, 1921, 2.771c. 10-year pre-war average, 1.689c.
These products constitute 88 per cent of the United States output of finished steel.	

Composite Price, March 7, 1922, Pig Iron, \$18.25 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham	Feb. 28, 1922, \$18.10 Feb. 7, 1922, 18.10 Mar. 8, 1921, 25.64 10-year pre-war average, 15.72
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that in a number of products the mills have at least a month's business in sight. This is true of sheets and tin plate and the bookings of the wire manufacturers have gained substantially as a result of the stabilization in prices. There is an impression that the Jones & Laughlin Steel Co. accumulated a fair-sized backlog in the hot-rolled products before taking its recent action with regard to prices.

The railroads are evincing more interest in track material as the spring approaches, although making a strong effort to get prices down. Structural activities are showing more life and taking the general situation as it applies to the Pittsburgh district, it must be said that conditions are fairly satisfactory.

Activity still is lacking in the pig iron market outside of foundry grades and there is an utter absence of concern over the impending coal strike. Instead of an exerted demand for fuel in anticipation of a shortage, buying is of a most ordinary character and prices do not average much more than 25c. to 30c. a ton above the low point of January. Consumers generally are well

stocked, most of them having at least a month's supply in reserve, while a good deal of coal lately has been mined and current supply is more than sufficient for the present demand.

The scrap market still shows a strong tone due to purchases by dealers against recent sales in this and nearby districts, amounting to between 30,000 and 40,000 tons.

Plant activities have not changed greatly in the past week. The Carnegie Steel Co. is warming up one of its Isabella furnaces, at which it will be making iron by next week, while the Republic Iron & Steel Co. and the Cambria Steel Co. each are about ready to start up a furnace on Bessemer iron in connection with heavier operations of Bessemer converters. It is reported that a Valley furnace which is nearing the end of its supply of ore will go out of blast early in April.

Pig Iron.—There is a fairly good market in foundry iron, due to demands from radiator and sanitary ware interests, in addition to which producers report that shipping instructions against standing orders are more

insistent. One sanitary ware company has just closed for about 1000 tons of foundry iron, paying \$19, Valley furnace, for No. 2 grade. Furnaces outside the Valley also have obtained \$19 for the base grade, and there is considerable doubt that less than that price now can be done. Interest in the steel making grades is almost nil. The general asking price on basic is \$18, Valley furnace, but there has been no business here recently at above \$17.75. Valley furnace interests continue to quote Bessemer at \$19.50, but there is doubt that this price can be done since small lots have been sold for less, while the Cambria Steel Co. a short time ago took business at \$19, Johnstown, or \$20.96, delivered Pittsburgh, common rate points.

Iron and Steel Bars.—The advance to 1.50c., base, just announced by the Jones & Laughlin Steel Co., has not yet found any response among other makers. We note a sale of 800 tons of bars running 0.40 to 0.50 carbon, but reports about the price paid are conflicting. One is that the business was done at 1.30c., and the extra for carbon waived, and another that the price was 1.35c., plus the extra \$1 per ton for the carbon. Meanwhile several makers who have refused to go below 1.40c. still are holding to that figure. Reinforcing bar inquiries generally are for small tonnages. The R. R. Kitchen Co., Wheeling, W. Va., has the contract for a 10-story reinforced concrete office building to be erected in Wheeling, but has not yet put out the inquiry for the bars required. Inquiry for iron bars is reported to be somewhat better than it was recently.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.96 per gross ton:

Basic	\$17.75 to \$18.00
Bessemer	19.00 to 19.50
Gray forge	18.75
No. 2 foundry	19.00
No. 3 foundry	18.75
Malleable	19.00

Ferroalloys.—The market does not change much. While small tonnages of 80 per cent ferromanganese are being moved at \$62.50 Atlantic seaboard, for domestic material, large tonnage consumers are hesitating about placing orders at that figure, and apparently are finding accommodation at less money. The American Steel Foundries has an inquiry out for from 200 to 300 tons of this material. No German ferromanganese is being offered at present because most German makers have been out of production in the past few weeks on account of labor troubles. The latest advice is that there has been a resumption, but until an exportable surplus has been built up, German makers probably will remain out of the market. Interest in spiegeleisen has dwindled following the recent purchases by Youngstown and Canton, Ohio, consumers. The New Jersey Zinc Co. will blow in a furnace on spiegeleisen at Hazard, Pa., March 15. Spot supplies of spiegeleisen are very limited and no official announcement has been made with regard to forward deliveries. The market for 50 per cent ferrosilicon is dull and nominal.

We quote 78 to 82 per cent ferromanganese, \$62.50 c.i.f. Atlantic seaboard for domestic and English. Average 20 per cent spiegeleisen, nominal; 16 to 18 per cent, \$30 to \$35, delivered Pittsburgh or Valleys; 50 per cent ferrosilicon, domestic, \$55 to \$60 furnace, freight allowed. Bessemer ferrosilicon is quoted f.o.b. Jackson and New Straitsville, Ohio, furnaces as follows: 10 per cent, \$36.50; 11 per cent, \$39.80; 12 per cent, \$43.10; 13 per cent, \$47.10; 14 per cent, \$52.10; silvery iron, 6 per cent, \$25; 7 per cent, \$26; 8 per cent, \$27.50; 9 per cent, \$29.50; 10 per cent, \$31.50; 11 per cent, \$34; 12 per cent, \$36.50. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is \$4.06 per gross ton.

Steel Skelp.—The going quotation on steel pipe skelp is 1.40c., but inquiries generally are for small tonnages and it is probable that sizable tonnages could be placed for less.

Wire Rods.—The recently established price of \$36 for the base size of soft rods has found some basis in sales, and as a result of a steadier market in the finished products, orders and specifications again are on the increase. Prices are given on page 685.

Wire Products.—A firm stand by makers at \$2.40 base per keg for nails and \$2.25 base per 100-lb. for bright and annealed wire has given buyers some con-

fidence in the stability of the market and this finds reflection in larger orders and specifications. The demand is well distributed among the different products and the manufacturers are looking forward hopefully to a fairly good spring business. Concessions from established minimum quotations are practically unheard of because of advices to branch offices that no consideration would be given to orders carrying lower prices. Mills in this district are operating at about 60 per cent of capacity.

We quote wire nails at \$2.40 base per keg, Pittsburgh, and bright basic and Bessemer wire at \$2.25 base per 100 lb., Pittsburgh.

Billets, Sheet Bars and Slabs.—Open market activities are limited. Such demands as are coming out for the various forms of steel usually are for one or two carloads and early delivery is specified in all instances. There is no change in prices. Re-rolling billets still are available at \$28 Pittsburgh, or Youngstown, for 4-in. and larger, while the common quotation on small billets is \$29, Pittsburgh or Youngstown. The market on sheet bars still is commonly regarded as \$29, Pittsburgh or Youngstown, with freight rates equalized to point of consumption. A few small sales of forging billets have been made at \$32 Pittsburgh.

We quote 4 x 4-in. soft Bessemer and open-hearth billets at \$28; 2 x 2-in. billets, \$29; Bessemer and open-hearth sheet bars, \$29; slabs, \$28; forging billets, ordinary carbons, \$32, all f.o.b. Youngstown or Pittsburgh mills.

Steel Rails.—The market on light sections rolled from billets hardly is quotable on sales at more than 1.40c., base, although the Carnegie Steel Co. still is quoting 1.45c. Demand is lighter than it has been, but there is a fairly large aggregate tonnage in the small orders coming from coal mine operators for prompt shipment. Light rails rolled from old standard sections still are readily available at 1.35c. base mill. The local standard rail unit of the Steel Corporation has enough business in sight to keep it steadily engaged until about July 1. This year's bookings were about 100,000 tons while unspecified tonnages, carried over from last year, amounted to about 50,000 tons. The Baltimore & Ohio Railroad is reported to have withdrawn a recent inquiry for 17,000 tons.

We quote 25 to 45-lb. sections, rolled from new steel, 1.40c. base; rolled from old rails, 1.35c. base; standard rails, \$40 per gross ton mill for Bessemer and open-hearth sections.

Iron and Steel Pipe.—Orders for merchant steel pipe show a well sustained betterment, but it is commented upon that jobbers still are placing only such tonnages as they see a probable need for. The fact that considerable uncertainty as to the course of prices still exists tends to make jobbers cautious about anticipating their needs. As the spring approaches, more interest is being shown in oil country goods and inquiries for line pipe are more numerous. Among the latter are three lines out of the Wyoming field calling for a total of about 125 miles of 6-in. and 8-in. pipe. These are expected to be closed before long, as is also the order for 98 miles of 12-in. gas pipe line to be laid by the Southern Carbon Co. from the Munroe, La., field to Alexandria, La. Some low prices are coming out against line pipe inquiries. Card discounts are given on page 685.

We quote steel bars rolled from billets at 1.30c. to 1.40c.; reinforcing bars, rolled from billets, 1.30c. to 1.40c. base; reinforcing bars, rolled from old rails, 1.25c. to 1.30c.; refined iron bars, 2c. to 2.10c. in carloads, f.o.b. mill, Pittsburgh.

Structural Material.—Steel for the new Mellon National Bank Building, Pittsburgh, which will be a three-story, instead of a four-story structure, and for which 1650 tons will be required, will be furnished by the American Bridge Co., which also has taken 1000 tons of eye-bars and buckle plates for the Fort Pitt Bridge Co., for the Sixteenth Street bridge, Pittsburgh; 350 tons of beams for reinforcing work in a building of the Armstrong Cork Co., Pittsburgh, and 300 tons for a new building for the Commercial Savings Bank & Trust Co., Toledo, Ohio. The Riter-Conley Co. has taken a contract for 10 steel barges for the Island Creek Coal Co., Huntington, W. Va., requiring 1600 tons of steel, mostly plates. The P. H. Kelly Co., Philadelphia, has a contract for the erection of a junior high school, Monessen, Pa., for which about 100 tons of steel will be required. Inquiry still is brisk and

fabricating interests are looking forward to a good spring business. Few companies, however, have very full order books, and competition for work is so sharp that very low prices still prevail. Plain material demands are larger than they were earlier in the year, but there is still considerable room for improvement. The quotable market still is 1.35c. to 1.40c. Prices are given on page 685.

Plates.—Such business as has lately been done has been at about 1.35c., Pittsburgh. There was one sale of 2000 tons at that figure to a local tank and boiler company, which has the contract for a riveted pipe line for Bay City, Mich. About 2500 tons of plates will be required for 10 55,000-barrel tanks recently awarded the Riter-Conley Co. by the South Penn Oil Co. The advance to 1.50c. for plates by one company has not yet been followed by other makers, and on the basis of business done the market remains quotable at the recent range.

We quote sheared plates, $\frac{3}{4}$ in. and heavier, tank quality, at 1.35c. to 1.40c., f.o.b. Pittsburgh.

Sheets.—Last week was one of the best in the history of the American Sheet & Tin Plate Co. in the matter of orders and specifications and the experience of independent manufacturers has been only slightly less favorable. There is no marked tendency on the part of buyers to anticipate their requirements, the bulk of the orders being for early shipment, but consumers' stocks have been allowed to run so low that actual needs are becoming more pressing. Deviations from regular market quotations are few and unimportant. The leading interest has about 70 per cent of its sheet capacity in operation while independent schedules call for about 60 per cent operations. Prices are given on page 685.

Tin Plate.—Consumers still are specifying with considerable freedom against contracts, and these demands rather than new ones, are keeping mills here and in nearby districts running at a high rate. The Weirton Steel Co., the Trumbull Steel Co., the Jones & Laughlin Steel Co., the Standard Tin Plate Co., Washington Tin Plate Co. and the American Steel Co. all have all of their tin mills in full operation this week, while the Wheeling Steel Corporation now has five mills on at Yorkville, Ohio, where an effort is being made to operate on an open shop basis. The tin plate making subsidiary of the Steel Corporation is running about 60 per cent of capacity, but this is a natural result of the fact that many of its large customers anticipated their requirements and during that period the operation of this company ran well ahead of the independent mill activities. The "official" quotation on standard cokes remains at \$4.75 per base box, Pittsburgh, but the common basis on most mills to regular customers is \$4.60 and in some markets, notably in the East, even less than that price has been done. In a general way, however, there is fairly close observance of \$4.60 as a minimum.

We quote standard production coke tin plate, \$4.60 per base box f.o.b. Pittsburgh for carload lots.

Cold-Finished Steel Bars and Shafting.—There is a better demand from the automotive industry, but other consuming industries are providing little or no business and the aggregate of orders still is unsatisfactory. Agricultural implement manufacturers are carrying rather big stocks of both bars and completed machines and are not expected to be buyers of bars until this year's crops have been garnered and farmers are buying more tools. Machine tool makers also are negligible factors because they have so many machines made up and which are moving out slowly. The general quotation is 1.90c. base, Pittsburgh, but this price is being shaded \$1 to \$2 a ton on attractive orders. Ground shafting holds at 2.25c. base, mill, for carloads.

Hoops and Bands.—The market shows little life and prices are irregular and unsettled. On hoops most makers are trying to hold the market at 1.90c. base, Pittsburgh, but on inquiries of sufficient size to cause competition, that price is being shaded \$1 to \$2 a ton. Bands range from 1.75c. to 1.90c., but only retail lots command the higher figure.

Hot-Rolled and Cold-Rolled Strips.—Business is looking up and most makers now have fair-sized order

books. Mill operations average about 50 per cent, this being the highest rate in several months. Enlarged automobile plant operations and schedules are one reason, but other consuming industries also are busier. Some second quarter specifications are coming out, but as a rule buying is for early delivery. Prices do not change much. Cold-rolled strips are fairly steady at 3.50c. base, Pittsburgh, and hot-rolled from 1.75c. to 1.85c. for large lots and 1.90c. to 2c. for small quantities.

Spikes and Track Bolts.—The approach of spring is bringing increase in inquiries from the railroads for track material, but they are buying cautiously and trying hard to get prices down. On very large lots of standard spikes, \$2 base per 100 lb. is possible, but on smaller lots such as are being bought the going price is \$2.10. Track bolts are rated at \$3 base per 100 lb. for carloads. An effort is being made to get 1c. per lb. more for less than carloads, but is not especially successful. Tie plate inquiries are numerous, but sales are moderate. The market is quotable from \$33 to \$38 per net ton, depending on specifications and tonnages involved. Prices are given on page 685.

Coke and Coal.—The coke market is considerably quieter than it was recently, and while it still is possible for producers to obtain recent maximum quotations of \$3.50 per net ton oven for furnace grade, and about \$1 per ton more for foundry coke, there is rather more resistance to these prices on the part of buyers than there was recently. Small tonnages have sold 25c. per ton below these figures and there is a possibility of \$3.25 becoming a common quotation on furnace coke soon, through the release of tonnages now moving on short term contracts. A Buffalo steel making interest making its own by-product plant on union coal is seeking 15,000 tons of beehive oven coke a month for second quarter delivery, rather than take the chance of not being able to get coal from its own properties in the event of a strike. Quotations of \$3.50 against this inquiry have been rejected as too high. Stocking of foundry coke still is going on and is the sustaining influence on prices. Steam coal still is available at \$1.50 to \$1.85 for mine run grade, by-product from \$1.75 to \$2 and non-union gas coal from \$2.15 to \$2.40.

Old Material.—Apparently some of those who recently took business from the steel makers here and in nearby districts sold short against a considerable portion of the tonnages and covering of these sales now is the sustaining influence on prices. Offerings at the moment are moderate because production is seasonably light and prices are not high enough to permit the shipment of material from dealers' yards. Offerings of steel scrap by the New York Central and Erie Railroads brought \$15.35 to \$15.40 Youngstown, and as high as \$15.75, Pittsburgh, was paid on the steel offered by the Pennsylvania Railroad, Central Region. The latter is being applied on contracts carrying a maximum price of \$15. The market is rather soft on cast iron scrap for foundry use, but steel makers want heavy breakable cast and are paying relatively high prices.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate, as follows:

Heavy melting steel, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh.....	\$15.00 to \$15.50
No. 1 cast, cupola size.....	15.75 to 16.25
Re-rolling rails, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va., and Franklin, Pa.	15.00 to 15.50
Compressed sheet steel.....	13.00 to 13.50
Bundled sheets, sides and ends.....	12.00 to 12.50
Railroad knuckles and couplers.....	15.50 to 16.00
Railroad coil and leaf springs.....	15.50 to 16.00
Low phosphorus standard bloom and billet ends.....	17.00 to 17.50
Low phosphorus plates and other grades.....	16.50 to 17.00
Railroad malleable.....	13.00 to 13.50
Iron car axles.....	23.00 to 24.00
Locomotive axles, steel.....	21.00 to 22.00
Steel car axles.....	15.50 to 16.00
Cast iron wheels.....	15.50 to 16.00
Rolled steel wheels.....	15.50 to 16.00
Machine shop turnings.....	10.00 to 10.50
Sheet bar crop ends.....	15.00 to 16.00
Heavy steel axle turnings.....	12.00 to 12.50
Short shoveling turnings.....	11.50 to 12.00
Heavy breakable cast.....	14.75 to 15.25
Stove plate.....	12.50 to 13.00
Cast iron borings.....	11.50 to 12.00
No. 1 railroad wrought.....	12.50 to 13.00

Chicago

CHICAGO, March 7.

February records of local steel mills show marked gains over January in shipments, orders booked and production. For one important Chicago producer shipments increased 33 per cent, orders booked increased 32 per cent and ingot production 52 per cent. That this general betterment is continuing is indicated by current operating reports. The Illinois Steel Co. has blown in its thirteenth furnace, giving it seven active stacks at Gary, four at South Works and two at Joliet, and has increased its ingot production during the week from 55 per cent to 63½ per cent. Of the company's individual plants, the Gary works is leading, having reached an operating basis of 77 per cent last week. The Inland Steel Co. continues to run at 60 per cent with every prospect of bettering that record next week.

Undoubtedly the large tonnages bought by railroads and car builders account in considerable measure for the improvement in mill operations, but miscellaneous demand also continues to expand steadily, although consisting mainly of small individual orders. In fact, the mills are not encouraging forward buying, being unwilling to book plates, shapes and bars at current prices for delivery beyond March. The trend toward greater firmness in these three commodities is indicated by an announcement made by the Inland Steel Co. to-day that no further business will be taken at less than 1.60c., Indian Harbor.

The threatened coal strike has had little perceptible effect on either the steel or pig iron markets up to date. The only precautionary measures taken so far have had to do with fuel requirements, orders for foundry and furnace coke being more numerous. Connellsville foundry has advanced to a minimum of \$4.50 ovens, while local by-product foundry coke remains unchanged at \$10.75, delivered Chicago switching district.

Another labor controversy was reopened to-day in Chicago when the United States Railroad Labor Board started hearings on an application of the railroads for a general reduction in wages back to the basis existing before the advance of 1920.

Ferroalloys.—An inquiry for 200 tons of ferromanganese is before the trade and several carlot inquiries for spiegeleisen are pending. Prices on these alloys are firm and it is notable that available furnace stocks of spiegeleisen are very low.

We quote 78 to 82 per cent ferromanganese, \$70.90, delivered; 50 per cent ferrosilicon, \$56 to \$57.50, delivered; spiegeleisen, 16 to 18 per cent, \$40.10, delivered.

Pig Iron.—Notwithstanding occasional signs of weakness such as were noted a week ago, the local iron market is growing firmer as the steel works which has been long a source of active competition becomes less of a factor in the market. This interest has all the merchant iron bookings it can handle for a considerable period ahead, and at the same time must use an increasingly large proportion of its blast furnace output as the operations of its mills expand. So far as Chicago and immediate surrounding territory are concerned, a minimum price of \$20 local furnace is well established. Concessions are being made only in competitive territory where the delivered prices of outside furnaces figure lower than that of Chicago producers. On the whole, the market is quieter than before the advance, and it is probable that melters are delaying action on large inquiries until they are thoroughly convinced that the present market will hold. New inquiries of any size are few. The National Sewing Machine Co., Belvidere, Ill., wants 200 tons of foundry for April shipment. The Chicago Hardware Foundry Co. is in the market for 500 tons of Southern foundry for delivery at North Chicago. Sales of Southern foundry in this territory are increasing, one broker reporting total bookings of 2000 tons within the past week. The Kewanee Boiler Co., Kewanee, Ill., has bought 500 tons of Southern foundry for delivery by the water and rail route. Iron moved north in this manner is quoted at \$20.77, delivered Chicago, while the lowest competing Southern price is \$15 base, Birmingham, or \$21.67, Chicago. Practically all charcoal iron producers are

now quoting \$22.50, base furnace. A local melter has bought 300 tons of copper bearing low phosphorus at approximately the market, which is \$2 below copper free material.

Quotations on Northern foundry, high phosphorus malleable and basic irons are f.o.b. local furnace and do not include a switching charge averaging 70c. per ton. Other prices are for iron delivered at consumers' yards, or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging sil. 1.50, delivered at Chicago.....	\$26.00
Northern coke, No. 1, sil. 2.25 to 2.75	20.50
Northern coke, foundry, No. 2, sil. 1.75 to 2.25.....	20.00
Northern high phos.....	20.00
Southern foundry, sil. 1.75 to 2.25....	\$20.77 to 21.67
Malleable, not over 2.25 sil.....	20.00
Basic	20.00
Low phos., Valley furnace, sil. 1 to 2 per cent copper free.....	30.00
Silvery, sil. 8 per cent.....	32.82

Railroad Equipment.—The Chicago & Northwestern has put out an inquiry for 2750 freight cars, including 1250 box, 500 stock, 250 gondola, 500 flat and 250 refrigerator cars. The Monon is inquiring for 20 locomotives.

Steel Castings.—Orders for the miscellaneous castings for the Burlington cars have been distributed under protections granted by the foundries 90 days ago. The Standard Steel Car Co. has let the castings for 2600 refrigerator cars for the Pacific Fruit Express to the Ohio Steel Foundry Co.

Bars.—Demand from jobbers and miscellaneous manufacturers is increasing in volume and there continues to be a fair amount of reinforcing business. Automobile manufacturers in the Detroit district are now operating at from 65 to 75 per cent of capacity and the implement makers are placing more orders to round out their stocks in preparation for a resumption of production. In the reinforcing field, bids were taken yesterday on 300 tons for the Children's Hospital and Nurses' Home, Milwaukee. An inquiry from the Great Northern for 800 tons for Lake Superior docks is pending. Prices on mild steel bars are unchanged. Bar iron mills continue to operate intermittently. As bar iron is selling at a higher figure than steel bars, the latter product is being substituted for purposes for which bar iron was customarily used.

Mill prices are: Mild steel bars, 1.50c. to 1.60c., Chicago; common bar iron, 1.55c. to 1.60c., Chicago; rail carbon, 1.50c., mill or Chicago.

Jobbers quote 2.53c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars and shafting is 3.40c. for rounds and 3.90c. for flats, squares and hexagons. Jobbers quote hard and medium deformed steel bars at 1.90c. base. Hoops and bands, 3.13c.

Sheets.—Jobbers and manufacturing consumers alike are taking an active interest in the market and prices are increasingly firm. Some mills are now selling Nos. 10 and 12 gage blue annealed on a straight sheet basis, whereas until recently they took some business on a plate basis to meet plate mill competition.

Mill quotations are 3c. for No. 28 black, 2.25c. for No. 10 blue annealed and 4c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight rate to Chicago of 38c. per 100 lb.

Jobbers quote: Chicago delivery out of stock, No. 10 blue annealed, 3.38c.; No. 28 black, 4.15c.; No. 28 galvanized, 5.15c.

Wire Products.—Demand shows some improvement and prices are on a firmer footing, but buying is not yet on the scale to be expected at this season of the year. With the improvement in the grain and live stock markets, however, jobbers serving the agricultural districts look forward to increased trade. For mill prices, see finished iron and steel, f.o.b. Pittsburgh, page 685.

We quote warehouse prices f.o.b. Chicago: No. 9 and heavier black annealed wire, \$2.85 per 100 lb.; No. 9 and heavier bright basic wire, \$3 per 100 lb.; common wire nails, \$3 per 100 lb.; cement coated nails, \$2.50 per keg.

Warehouse Prices.—Local jobbers have reduced wire and nails to the prices appended under the wire products paragraph.

Rails and Track Supplies.—The Missouri Pacific has placed 18,000 tons of rails, of which 12,000 went to the Colorado mill, 2000 to Tennessee, 3000 to Gary and 1000 to Inland. The Illinois Central has bought 2000

kegs of track spikes at less than 2.40c., delivered. There is still considerable business in track supplies pending and it is notable that rail specifications received at the Gary mill are increasingly liberal.

Standard Bessemer and open-hearth rails, \$40; light rails rolled from new steel, 1.50c. to 1.60c., f.o.b. makers' mills. Standard railroad spikes, 2.05c. to 2.10c., Pittsburgh; track bolts with square nuts, 3.05c. to 3.10c., Pittsburgh; tie plates, steel and iron, 1.65c. to 1.75c., f.o.b. mill; angle bars, 2.40c., f.o.b. mill.

Plates.—The steady expansion in demand from miscellaneous sources is regarded as of far greater significance than the business recently placed by carbuilders which, although involving large individual tonnages, is believed to be of a temporary character. It is the smaller orders, from jobbers, boiler plants, fabricators, and numerous small manufacturers upon which the mills must depend for anything approaching steady operations and the fact that this class of business is slowly increasing is considered an indication of general industrial revival. In this connection it is notable that jobbers are now laying in stocks not only of plates, but also structural shapes, bars and sheets. At the same time, mills are showing less inclination to accept orders at current prices for forward delivery beyond March. The Sinclair Oil Co. has let 10 oil tanks, involving 3000 tons of plates, to the Chicago Bridge & Iron Co. and still has 10 tanks to place. The tanks are to be erected in Kansas and Oklahoma.

The ruling mill quotations range from 1.50c. to 1.60c., Chicago. Jobbers quote 2.63c. for plates out of stock.

Bolts and Nuts.—Demand is slowly expanding with business coming in from jobbers, railroads, automobile makers and miscellaneous manufacturers. While the market is still weak, bolt and nut makers in this district are in many cases selling at the discounts published on page 685, f.o.b. their plants.

Jobbers quote structural rivets, 3.43c.; boiler rivets, 3.53c.; machine bolts up to $\frac{3}{4}$ x 4 in., 60, 10 and 10 per cent off; larger sizes, 60 to 10 off; carriage bolts up to $\frac{3}{4}$ x 6 in., 60 and 10 off; larger sizes, 55 and 5 off; hot pressed nuts, square and hexagon tapped, \$3.75 off; blank nuts, \$4 off; coach or lag screws, gimlet points, square heads, 65 and 5 per cent off. Quantity extras are unchanged.

Structural Material.—Fabricating shops in this district are not operating nearly so well as the mills, but they are looking forward to better business as the season progresses. The past week, however, has been rather disappointing both from the standpoint of lettings and new inquiries. Awards include:

Elks' Building, Bakersfield, Cal., 408 tons, to Golden Gate Iron Works.

Mt. Vernon Car Mfg. Co., truck shop, Mt. Vernon, Ill., 450 tons, to McClintic-Marshall Co.

Kansas City Cold Storage & Warehouse Co., plant, Kansas City, Mo., 218 tons, to Kansas City Structural Steel Co.

Palmolive Co., plant, Milwaukee, 120 tons, to Milwaukee Structural Steel Co.

School, Whiting, Ind., 125 tons, to Duffin Iron Works.

Interstate toll bridge, Prescott, Wis., for Prescott Bridge Co., 360 tons, to Milwaukee Bridge Co.

Pending business includes:

Milwaukee Sewerage Commission, power and boiler house for Jones Island disposal plant, 530 tons, bids to be in March 10.

Indianapolis Athletic Club, 1425 tons.

Wild Bank Building, Indianapolis, 515 tons.

Masonic Temple, Aurora, Ill., 300 tons, W. Q. Bendus, Chicago, architect.

The mill quotation on plain material ranges from 1.50c. to 1.60c., Chicago. Jobbers quote 2.63c. for plain material out of warehouse.

Cast-Iron Pipe.—The Milwaukee Department of Public Works takes bids March 14 on 1430 tons of 6- to 16-in. water pipe and specials. The United States Cast Iron Pipe & Foundry Co. will furnish 1350 tons for Chicago, and the Lynchburg Foundry Co. has the contract for 110 tons for Muskegon, Mich. The market has a firmer tone with 6-in. and over at a minimum of \$33, Birmingham.

We quote per net ton, f.o.b. Chicago, as follows: Water pipe, 4-in., \$46.10 to \$47.10; 6-in. and above, \$42.10 to \$43.10; class A and gas pipe, \$3 extra.

Old Material.—The market shows greater strength and numerous grades have advanced 25c. to 50c. a ton, but it is notable that consumptive buying is conservative with a tendency towards contraction as prices go

up. In fact, some buyers are of the opinion that the current rise in the market is due in large measure to trading between dealers as well as to speculative buying of railroad material. On the other hand, there are those who feel that a sustained swing upward has started which will accompany an increase in industrial activity which has already made itself apparent in more widely distributed sales of scrap. Railroad offerings include the Santa Fe, 2500 tons; the Union Pacific 2000 tons; and the Soo Line, and the Chicago and Eastern Illinois, 500 tons.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails	\$16.00 to \$16.50
Relaying rails	20.00 to 25.00
Cast iron car wheels	15.50 to 16.00
Rolled or forged steel car wheels	13.50 to 14.00
Steel rails, rerolling	12.50 to 13.00
Steel rails, less than 3 ft.	13.25 to 13.75
Heavy melting steel	11.75 to 12.25
Frogs, switches and guards cut apart	11.75 to 12.25
Shoveling steel	11.25 to 12.75
Low phos., heavy melting steel	13.50 to 14.00
Drop forge flashings	7.75 to 8.25
Hydraulic compressed sheet	8.50 to 9.00
Axle turnings	8.50 to 9.00
Per Net Ton	
Iron angles and splice bars	14.25 to 14.75
Steel angle bars	11.50 to 12.00
Iron arch bars and transoms	16.00 to 16.50
Iron car axles	19.50 to 20.00
Steel car axles	13.00 to 13.50
No. 1 busheling	9.00 to 9.50
No. 2 busheling	6.00 to 6.50
Cut forge	10.25 to 10.75
Pipes and flues	7.25 to 7.75
No. 1 railroad wrought	11.25 to 11.75
No. 2 railroad wrought	10.75 to 11.25
Steel knuckles and couplers	12.00 to 12.50
Coil springs	12.75 to 13.25
No. 1 machinery cast	13.75 to 14.25
No. 1 railroad cast	13.25 to 13.75
Low phos. punchings	11.00 to 11.50
Locomotive tires, smooth	10.00 to 10.50
Machine shop turnings	5.50 to 6.00
Cast borings	7.00 to 7.50
Stove plate	12.50 to 13.00
Grate bars	10.50 to 11.00
Brake shoes	10.50 to 11.00
Railroad malleable	12.00 to 12.50
Agricultural malleable	12.00 to 12.50

Buffalo

BUFFALO, March 6.

Pig Iron.—Probably at no time in the history of the Buffalo market has such a peculiar condition existed; with improved demand for every grade of iron, prices are perhaps weaker than at any stage since the inception of the depression. Some sales of Buffalo iron at \$18 have been made at New England points and for delivery in Buffalo and the immediate territory \$18.25 and \$18.50 for silicon 1.75 to 2.25 is a common consideration. About 14,000 tons have been sold and inquiry is much brighter. More foundries are operating in a limited way. A furnace quoting \$19, and not particularly keen to take business at that figure, has sold nothing. A firmer market is expected if the coal strike becomes a certainty. Out of a total volume of sales by one furnace amounting to 8000 tons, one was for 1000 tons and several for 400 and 500 ton lots.

We quote f.o.b. per gross ton Buffalo as follows:

No. 1 foundry, 2.75 to 3.25 sil.	\$19.00 to \$19.50
No. 2X foundry, 2.25 to 2.75 sil.	18.50 to 19.00
No. 2 plain, 1.75 to 2.25 sil.	18.00 to 18.50
Basic	18.00 to 18.25
Malleable	18.50 to 19.00
Lake Superior charcoal	27.75

Finished Iron and Steel.—Very definite improvement has appeared and in some materials sales have exceeded the present rate of production. Bars have been in good demand and in cold finished and wire products orders have come in since the beginning of March at a brisker rate than in any like period in a year. Buyers are apparently confident they will not see a lower market this year with particular reference to sheets. The price of \$2.25 for No. 10 gage blue annealed and \$3 for black has not been disturbed in the face of keen competition. In Buffalo a number of sales of tonnages varying from 25 to 100 tons at the above prices f.o.b. Pittsburgh have created confidence in the strength of the sheet market. Immediate delivery is the first requirement of most of

this business from buyers who have been out of the market for some time.

We quote warehouse prices f.o.b. Buffalo as follows: Structural shapes, 2.65c.; plates, 2.65c.; plates, No. 8 gage, 3.35c.; soft steel bars and shapes, 2.55c.; hoops and bands, 3.15c.; blue annealed sheets, No. 10, 3.40c.; galvanized steel sheets, No. 28, 5.25c.; black sheets, No. 28, 4.25c.; cold-rolled strip steel, 5.90c.; cold-rolled round shafting, 3.40c.

Warehouse Business.—Plate demand has been especially good and signs of better business in structural shapes are appearing with the progress of the spring season. March business to date has been generally more satisfactory than in January or February. Repairs to equipment of plants at Niagara Falls have developed some satisfactory business and a general overhauling of machinery in the chemical industries of that city seems to be going on.

Coke.—Efforts to anticipate future needs by stocking up far ahead have brought about price advances and best grades are quoted at \$4.50 to \$5.50 ovens for foundry coke.

Old Material.—While trade in all lines of old material is lively and demand better than in months, prices remain the same. The one mill which has been in the market for heavy melting steel for some time is still able to buy at \$13.50. Outside Buffalo it is understood that steel is quoted higher, and in railroad lists which closed March 2 quotations of \$15.50 Youngstown ruled. Demand for borings and turnings continues to increase and in all materials the week was the best this year.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel.....	\$13.00 to \$14.00
Low phos., 0.04 and under.....	17.00 to 18.00
No. 1 railroad wrought.....	15.00 to 16.00
Car wheels.....	16.50 to 17.50
Machine shop turnings.....	7.50 to 8.00
Cast iron borings.....	7.00 to 8.00
Heavy axle turnings.....	10.50 to 11.50
Grate bars.....	12.00 to 13.00
No. 1 busheling.....	10.00 to 11.00
Stove plate.....	15.00 to 16.00
Bundled sheet stampings.....	8.00 to 9.00
No. 1 machinery cast.....	17.00 to 18.00
Hydraulic compressed.....	10.50 to 11.50
Railroad malleable.....	13.00 to 14.00

Cleveland

CLEVELAND, March 7.

Iron Ore.—It is reported that the railroads in the central territory will make a 15 per cent reduction in carrying rates on ore from lower lake ports to interior furnaces about April 1. Ore shippers have been advised that the matter is under consideration and the report of a 15 per cent cut has reached them from sources that lead them to give it considerable credence. It has been reported that the railroads in the Eastern territory may make a 28 per cent reduction on ore rates April 1. Information received by local ore shippers indicates that the proposed Eastern reduction will apply to Southern and New York ore as well as to imported ore. The final hearing in the ore rate case before the Interstate Commerce Commission which was to have started in Chicago yesterday has been postponed until March 21 at the request of the railroads. The improvement in the iron and steel industry will be reflected somewhat in the ore mining industry. Because of the better outlook for iron and steel, Oglebey, Norton & Co. will resume operations in their Eureka mine in the Gogebic range within a few days. Ore shipments from dock continue very light. During February, dock shipments amounted to only 166,507 gross tons as compared with 211,533 tons in January and with 523,098 tons during February, 1921. The balance on Lake Erie docks March 1 was 8,057,958 tons as compared with 8,699,284 tons on the same day last year.

We quote delivered lower lake ports: Old range Bessemer, 55 per cent iron, \$6.45; Old range non-Bessemer, 51½ per cent iron, \$5.70; Mesabi Bessemer, 55 per cent iron, \$6.20; Mesabi non-Bessemer, 51½ per cent iron, \$5.55.

Pig Iron.—The market continued fairly active during the week with a large number of small-lot sales. Some producers report a further improvement in shipments. One lake furnace booked 7,000 tons during the week, this being made up of over 50 orders which with two or three exceptions, were for small lots. While

most orders are for delivery over a period of 60 days or less, some consumers are showing a disposition to contract for longer periods. The largest order reported was for 1,000 tons of malleable iron for delivery until July 1, this coming from a Michigan foundry that specializes in automobile castings. An Indianapolis melter purchased 300 tons of malleable iron. Recent price levels are being maintained. Lake furnace quotations on foundry iron range from \$19 to \$20, but the lower price generally prevails except for nearby shipment and one or two lake furnaces will still go to \$18.50 for foundry iron for shipment to some competitive points. For Cleveland delivery, local furnaces quote No. 2 foundry iron at \$19 to \$19.50 at furnace. One Cleveland pig iron interest which expects to put a furnace in blast shortly unless a coal strike interferes has withdrawn from the market as it has only sufficient stock to fill existing orders. We note the sale of 200 tons of Ohio silvery iron to an Indiana melter at the regular price.

Quotations below are f.o.b. local furnace for Northern foundry iron, not including a 56c. switching charge. Other quotations are delivered Cleveland, being based on a \$1.96 freight rate from Valley points, a \$3.36 rate from Jackson and a \$6.67 rate from Birmingham:

Basic.....	\$19.71
Northern No. 2 fdy., sil. 1.75 to 2.25.....	\$19.00 to 19.50
Southern fdy., sil. 1.75 to 2.25.....	22.17
Ohio silvery, sil. 8 per cent.....	30.86
Standard low phos., Valley furnace.....	32.00

Semi-Finished Steel.—The demand for sheet bars has improved, but mills are still buying in small lots, purchasing one week for the following week's requirements. Prices are apparently well established at \$29, Youngstown, for sheet bars and \$28 for slabs.

Finished Material.—The demand has further improved. While business is still mostly in car lots, larger orders have become more plentiful. These include 500 tons of bars placed by a spark plug manufacturer, 350 tons from a rivet manufacturer, and 500 tons of plates and structural material placed by a jobber. The most important development in the price situation was the announcement to-day of a price advance to 1.50c. on steel bars, plates and structural material by the Jones & Laughlin Steel Co. While it is too early to judge the effect of the price advance by the Pittsburgh company on other producers, it is believed that with the existing sentiment among sellers it will result in a little stiffening of prices all around. However, the market is still quotable at 1.40c. for steel bars, plates and structural material for desirable orders. A local mill continues to take a fair amount of business in plates in the lighter gages at 1.50c. to 1.60c. The Otis Steel Co. has its Lakeside plate mill in operation this week for the first time since December. Hard steel reinforcement bars are very irregular. Some rerolling mills are apparently using their location as basing points and are naming prices equivalent to below 1.35c., Pittsburgh. The contractor for the Baldwin Reservoir, Cleveland, is about to place 2000 tons of twisted square or deformed bars for that work. The strike in the building trades in Cleveland has put a stop to all the larger building work and little new inquiry for fabricating material has come out. The American Bridge Co. has taken the Commercial Trust and Savings Bank Building, Toledo, requiring 250 tons, and an inquiry is out for 200 tons for a school building at Painesville, Ohio. Fabricators are figuring on Northern Pacific bridge work requiring 6000 tons of steel.

Jobbers quote steel bars, 2.36c.; plates and structural shapes, 2.46c.; No. 9 galvanized wire, 3c.; No. 9, annealed wire, 2.50c.; No. 28 black sheets, 3.75c.; No. 28 galvanized sheets, 4.75c.; No. 10 blue annealed sheets, 3.10c.; hoops and bands, 2.96c.; cold-rolled rounds, 3.25c.; flats, squares and hexagons, 3.75c.

Sheets.—The demand for black, blue annealed and automobile body sheets continues to improve. A leading Detroit automobile manufacturer is in the market for 2000 tons of frame stock and is also expected to close next week for a round tonnage of full finished sheets. A Cleveland mill during the week took 500 tons of black sheets for Japan and has quotations out on several other Japanese inquiries. Regular prices are being firmly held.

Warehouse Business.—Warehouse sales show a slight gain from week to week. Prices are firm and unchanged.

Wire Products.—All the leading mills are holding firmly to 2.40c. for nails and 2.25c. for wire. A buyer attempted to break the market with a large inquiry during the week, but was unsuccessful and did not place the order.

Bolts, Nuts and Rivets.—The demand for bolts and nuts continues to show an improvement and makers are now operating their plants at 50 per cent or more of capacity. Prices are about as irregular as they have been, most of the weakness apparently being in the Chicago territory. The demand for rivets has improved slightly. The leading local maker is adhering to the regular prices of 2.10c. for structural rivets and 2.20c. for boiler rivets.

Coke.—Some producers have advanced the price on foundry coke 25c. a ton and others have withdrawn from the market until they get caught up with existing orders. We quote Standard Connellsville foundry coke at \$4.25 to \$4.75 per net ton at oven. The demand is not active.

Old Material.—The local scrap market is again rather quiet after the activity noted last week, and the upward movement of prices has apparently been checked, the only change in quotations being an advance of 25c. a ton on heavy melting steel. A Canton mill has purchased some heavy railroad scrap at around \$15.25. For Youngstown delivery heavy melting is quoted at \$15 and dealers are offering \$13 for this grade delivered to a Cleveland mill. A Cleveland consumer has purchased the March output of machine shop turnings of a Detroit automobile plant at a reported price of \$7 Detroit or \$10.36 delivered.

We quote per gross ton, f.o.b. Cleveland, as follows:

Heavy melting steel.....	\$12.25 to \$12.75
Steel rails, under 3 ft.....	12.75 to 13.25
Steel rails, rerolling.....	14.50 to 15.00
Iron rails.....	12.00 to 12.50
Iron car axles.....	18.00 to 19.00
Low phosphorus melting.....	13.50 to 14.00
Cast borings.....	9.00 to 9.25
Machine shop turnings.....	8.75 to 9.00
Mixed borings and short turnings.....	8.75 to 9.00
Compressed steel.....	9.25 to 9.75
Railroad wrought.....	12.00 to 12.50
Railroad malleable.....	12.50 to 13.00
Light bundled sheet stampings.....	7.00 to 8.00
Steel axle turnings.....	9.50 to 10.00
No. 1 cast.....	15.00 to 16.00
No. 1 busheling.....	9.00 to 9.25
Drop forge flashings, over 10 in.....	9.00 to 9.25
Drop forge flashings, under 10 in.....	9.25 to 9.75
Railroad grate bars.....	12.75 to 13.00
Stove plate.....	13.00 to 13.25
Pipes and flues.....	8.50 to 9.00

Birmingham

BIRMINGHAM, ALA., March 6.

Very good bookings were made last week and the week before by Birmingham furnaces on a base of \$15.50 with few departures in either direction. The market gathered strength strategically, but prices showed no tendency to advance. One maker did the best business of many months the week ending Feb. 25, booking over 4,000 tons, including a lot of 2,000 tons, the remainder being smaller lots. A Southern stove foundry paid \$15.50 for 500 tons. Bookings of Sloss-Sheffield Steel & Iron Co. of its Sheffield iron going into middle and far west via Ohio river gateways through barge service on the Tennessee river are understood to have aggregated a very considerable volume with deliveries being promptly made. Birmingham district furnaces are also getting into St. Louis, Indiana, Ohio and Illinois markets with numerous lots for many kinds of consumers. The pronounced feature of the larger tonnage recently booked is that very little has come from the pipe interests, the bulk being from the general foundry trade with radiator works and stove plants large takers. One maker remains out of the market on account of sold-up condition. Another maker entered the month with 10,000 tons for March delivery on a one-furnace make. It is known that one or two makers feel so confident of the future that they are having extra furnaces kept in readiness for operations on a day's notice. Recent additional furnace capacity has been for steel mill purposes. One maker booked 1,200 tons in lots from car loads to 300 tons in a day. Consumers are clamoring for prompt delivery

and tracers are sent on slightest delay. There are six active merchant furnaces in Alabama now, seven on basic and two on charcoal. There have been several sales of charcoal iron.

We quote per gross ton f.o.b. Birmingham district furnaces as follows:

Foundry, silicon 1.75 to 2.25.....	\$15.50
Basic.....	14.50
Charcoal, warm blast.....	32.00

Finishing Mills.—The Tennessee company is continuing full turn at the Ensley ingot mill this week and, following the blowing in of Ensley No. 4, it has just blown in Alice furnace in Birmingham. This gives it six stacks producing basic iron. All finishing mills are going this week with the exception of the plate mill at Fairfield, but the plate mill at Bessemer is in operation. The rail mill is again on a schedule of 10,000 tons. Wire drawing mills of the American Steel & Wire Co. and Gulf States Steel Co. are at about the capacity of last November, which ranged around 60 per cent. New wire drawing business is coming in well with wire fencing again in demand. Structural steel has become active. The Ingalls Iron Works made unusually large bookings in January for Florida, Louisiana, Georgia and Alabama. Export structural steel is picking up and orders are being figured on.

Cast Iron Pipe.—High pressure pipe makers are receiving a steady inflow of new business with prices firm at \$33. The National Cast Iron Pipe Co. and American Cast Iron Pipe Co. booked additional orders for the West. Sanitary pipe makers report jobbers as still reluctant to place business, but expect an early change of front. Base remains at \$37 for standard.

Coal and Coke.—Coal production has risen from an average of 225,000 to 260,000 tons a week following furnace resumption and increased railroad traffic. Some consumers are laying in extra stocks as protection against labor troubles and advances in price for spot coal. Steam coal averages \$1.90 per ton, but as low as \$1.50 is heard of. Coke is in acute demand and operations are increasing. The price is held firmly at \$5.

Old Material.—Yards are about out of cast scrap owing to recent active demand. Three thousand tons of No. 1 steel are reported to have sold at as low as \$9.50, but usual yard man will not sell under quoted price. Scrap is making a turn for the better with cast strong.

We quote per gross ton f.o.b. Birmingham district yards as follows:

Steel rails.....	\$11.00 to \$12.00
No. 1 steel.....	10.00 to 11.00
No. 1 cast.....	14.00 to 15.00
Car wheels.....	13.00 to 14.00
Tramcar wheels.....	12.00 to 13.00
No. 1 wrought.....	12.00 to 13.00
Stove plate.....	11.00 to 12.00
Cast iron borings.....	6.00 to 7.00
Machine shop turnings.....	6.00 to 7.00

Boston

BOSTON, March 7.

Pig Iron.—One Buffalo furnace took practically all of the business offered in this territory last week, including three round tonnage lots. The Portland Stove Co., Portland, Me., inquiry for 50 to 150 tons of No. 2X is the only one made general last week that remains uncovered. That company has enough iron on hand to last through the summer and is in no hurry to buy. The Draper Co., Hopedale, Mass., bought 1000 tons No. 1X and a small tonnage of charcoal iron; the General Fire Extinguisher Co., Providence, R. I., 600 tons No. 1X and 300 tons No. 2X; the Gurney Heater Co., Framingham, Mass., 1000 tons No. 2X; the Old Colony Foundry, Bridgewater, Mass., 200 tons No. 1X, and several other Massachusetts foundries smaller amounts. No. 2 plain Buffalo iron sold on a basis of \$18 furnace, No. 2X at \$18 and \$18.25 furnace, and No. 1X at \$18 and \$18.25. The same furnace expects to close on 500 tons of No. 2X to-day with a Massachusetts foundry. The cleaning up of available business last week has left the market in a firmer position. The Buffalo market is now generally established on a \$18.50 furnace basis. Eastern Pennsylvania furnace interests heretofore offering iron in competition with \$18 Buffalo have withdrawn competitive quotations, and with other furnaces

in its district are quoting on a basis of \$20, \$20.50 and \$21 furnace, respectively, for No. 2 plain, No. 2X and No. 1X. Other sales for the week include two one-car and one 100-ton lot of Lake charcoal to Massachusetts foundries at \$22.50 furnace, and 65 tons of malleable at \$18 furnace to a Massachusetts melter. The only large prospective customer is the H. B. Smith Co., Westfield, Mass., heating appliances. That company possibly will not buy, however, until it has made a new wage scale with its molders.

We quote delivered at common New England points as follows, having added to furnace prices \$4.06 freight from eastern Pennsylvania, \$5.46 from Buffalo, \$6.58 from Virginia and \$10.66 from Alabama:

East. Penn., sil. 2.25 to 2.75.....	\$24.56 to \$25.16
East. Penn., sil. 1.75 to 2.25.....	24.06 to 24.56
Buffalo, sil. 2.25 to 2.75.....	23.90 to 24.40
Buffalo, sil. 1.75 to 2.25.....	23.90
Virginia, sil. 2.25 to 2.75.....	29.58
Virginia, sil. 1.75 to 2.25.....	29.08
Alabama, sil. 2.25 to 2.75.....	26.66
Alabama, sil. 1.75 to 2.25.....	26.16

Ferromanganese.—Numerous small lots of ferromanganese, manganese 76 to 80, were sold in this territory the past week on a basis of \$70 furnace, the market showing more life than it has before in months. A small yet unusual consignment was received in Boston this week. It consisted of 25 tons of British ferromanganese, delivered direct by steamer to local pig iron interests, which sold the material two months ago.

Old Material.—Although not very active, the old material market is more so than it has been before in some time. Sales of heavy melting steel were made this week to Johnstown, Pittsburgh and other Pennsylvania mill interests at \$14 to \$15 and in some cases \$15.50 a ton delivered, or \$8.50 to \$9 New England shipping point, which represents an advance of 50c. Sales of turnings were made to a West Virginia steel mill and to a Pennsylvania rolling mill on a basis of \$4.50 to \$5 New England shipping point, and a round tonnage of skeleton was sold to New York State interests at \$10 delivered. There also has been good buying of chemical borings, shippers in a few instances paying as high as \$10 shipping point. Most lots, however, sold at \$9 to \$9.50. New England foundries continue to show indifference toward the machinery cast market. One Taunton, Mass., stove maker this week bought 200 tons No. 1 textile cast, and still another 100 tons at about 75c. per 100 lb., or \$16.80 delivered, which is considerably below the heretofore recognized range of delivered quotations.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery.....	\$17.00 to \$17.50
No. 2 machinery.....	15.00 to 15.50
Stove plate.....	14.50 to 15.00
Railroad malleable.....	13.00 to 13.50

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel.....	\$8.50 to \$9.00
No. 1 railroad wrought.....	10.50 to 11.00
No. 1 yard wrought.....	9.50 to 10.00
Wrought pipe (1 in. in diam., over 2 ft. long).....	7.00 to 7.25
Machine shop turnings.....	4.50 to 5.00
Cast iron borings, rolling mill.....	8.50 to 9.00
Cast iron borings, chemical.....	9.00 to 9.50
Blast furnace borings and turnings.....	4.50 to 4.75
Forged scrap and bundled skeleton.....	4.00 to 4.50
Street car axles.....	11.50 to 12.00
Shafting.....	12.00 to 13.00
Car wheels.....	11.00 to 11.50
Rerolling rails.....	8.50 to 9.00

A preliminary injunction in accordance with the restraining order issued recently was granted by Judge Cochran in the Federal Court at Maysville, Ky., against the strikers at the plant of the Andrews Steel Co. in Newport, Ky. The injunction prohibits any of the defendants from assembling or congregating in the proximity of the plant and until further orders of the court members of the union are enjoined from maintaining any pickets at or near the plant.

Realizing that most libraries do not index pamphlets, the Bureau of Standards has adopted the plan of constituting its technologic papers into volumes, with pages consecutively numbered. To cover the first 202, which have already been issued, 15 volumes have been allotted. Beginning with No. 203 the sixteenth volume will be started. This will prevent the utter loss of reference value which otherwise accompanies unindexed pamphlets in libraries.

New York

NEW YORK, March 7.

Pig Iron.—Buying of pig iron has continued in a very active way during the past week, and sales made by New York agencies amounted to about 20,000 tons of various grades, of which 15,000 tons was by one firm. One transaction of a considerable tonnage about which details are not available was involved, but most of the buying was of moderate tonnages. In the past two or three days, no large inquiries have developed. A number of buyers are in the market for from 100 to 1000 tons, including a fair tonnage of malleable. The usual quotation on No. 2 plain, eastern Pennsylvania, is \$20 and 50c. higher on No. 2-X and \$1 higher for No. 1, but these prices have been shaded as much as \$1, and at Buffalo \$18 can still be done. Strike has been declared in a number of foundries in Brooklyn and Long Island City on account of a reduction of wages of molders from \$6.50 for an 8-hr. day to \$6 and melt has been greatly reduced. Despite reports that the contracts have been awarded for the segments for the vehicular tunnel by the general contractors, Booth & Flinn, Inc., this action has not been taken. The situation is still complicated by New Jersey politicians and the effort of the legislature to legislate the New Jersey Tunnel Commission out of existence. There are also some complications in regard to the occupation of certain streets needed by the commission for entrances and exits.

We quote delivered in the New York district as follows, having added to furnace prices \$2.52 freight from eastern Pennsylvania, \$5.46 from Buffalo and \$6.16 from Virginia:

East. Pa. No. 1 fdy., sil. 2.75 to 3.25..	\$22.52 to \$23.02
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	22.02 to 22.52
East. Pa. No. 2 fdy., sil. 1.75 to 2.25..	21.52 to 22.02
Buffalo, sil. 1.75 to 2.25.....	23.46 to 23.71
No. 2 Virginia, sil. 1.75 to 2.25.....	23.16

Coke.—Coke continues active, and marked scarcity has developed through the extraordinary demand attributed to the fear of the strike in the coal regions. Prompt furnace coke is now quoted at \$3.75, furnace, and foundry grades at \$4.50 to \$4.75. Deliveries are not as prompt as they were a short time ago. By-product coke is quoted at \$8.59 delivered to points on the Pennsylvania, Erie and Lackawanna railroads, and \$9.15 on the Central of New Jersey.

Ferroalloys.—The ferromanganese market is quiet with sales confined to carload lots. There is an inquiry for 1000 tons for delivery over the rest of the year and also one for 500 tons. There has been no change in prices, which continue firm. Spiegeleisen continues scarce and sales and inquiries are moderately active. In February more spiegeleisen was made than in any month since July, blast furnace returns on another page showing 4930 tons having been the output. Only 3610 tons of ferromanganese was made last month, one of the smallest outputs in several months. There is no interest in manganese ore and quotations are nominal. The 50 per cent ferrosilicon market is moderately active with prices unchanged. Quotations are as follows:

Ferroalloys

Ferromanganese, domestic, seaboard, per ton..	\$62.50
Ferromanganese, British, seaboard, per ton..	\$62.50
Spiegeleisen, 16 to 19 per cent, furnace, per ton.	\$30.00
Ferrosilicon, 50 per cent, delivered, per ton.	\$55.00 to \$60.00
Ferrotungsten, per lb. of contained metal, 40c. to 50c.	
Ferrochromium, 6 to 8 per cent carbon, 60 to 70 per cent Cr., per lb. Cr., delivered..	12c. to 14c.
Ferrovandium, per lb. of contained vanadium..	\$4.00

Ores

Manganese ore, foreign, per unit, seaboard..	25c. to 26c.
Tungsten ore, per unit, in 60 per cent concentrates.....	\$2.00 up
Chrome ore, 40 to 45 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard....	\$20.00 to \$25.00
Chrome ore, 45 to 50 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard....	\$25.00 to \$27.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS ₂ , New York.....	50c. to 60c.

Finished Iron and Steel.—The leading Pittsburgh independent, which has conducted a country-wide drive for business in the past two or three weeks, has booked sufficient orders to operate its plants at about 60 per cent during March and April and has advanced its prices on heavy tonnage products to 1.50c., Pittsburgh.

The only exception will be on quotations on which protection had been given for a definite period, such as export tonnages, and the ordinary everyday wants of its regular trade. Steel companies which have met the 1.30c. prices obtaining in certain instances rather than lose the business of regular customers, welcome the firmer appearance of prices, but it is too early to determine whether the chaotic price situation will be immediately remedied. Whether it is still possible to buy plates, shapes and bars at the low prices which were in effect last week, about 1.25c. for export and 1.30c. for domestic trade, is not entirely clear. Another factor which may tend to stiffen prices is the expectation of a coal miners' strike on April 1. As no prospective settlement of the differences between the operators and the workmen has yet appeared, the steel trade grows more apprehensive that the strike may actually be called. The New York Central opened bids last week on 23,000 tons of fabricated steel for the proposed bridge across the Hudson River at Castleton, N. Y. The Bethlehem Steel Bridge Corporation was the low bidder, its price being \$68.60, fabricated and erected. Inquiry for structural steel continues to show some gain. Among the new projects are the following: Addition for National Bank of Commerce, Norfolk, Va., 500 tons; department store, Richmond, Va., 3000 tons; addition to car inspection sheds of Boston Elevated, Boston, 300 tons. Jobs awarded include the following: New York Cotton Exchange Building, 3200 tons, to American Bridge Co.; addition to Thalheimer department store, Richmond, Va., 300 tons, to Richmond Structural Steel Co.; work for American Sugar Refining Co., Baltimore, Md., 170 tons, to McClintic-Marshall Co. Business has improved slightly in the past week. This not only applies to domestic but also to export trade. Bar iron is now quoted at 1.35c., Pittsburgh, by some Eastern mills, a further concession of \$1 a ton. Sheets continue firm. Tin plate can still be bought at \$4.60, with occasional large lots going at \$4.50. Wire products are unchanged.

We quote for mill shipments, New York, as follows: Soft steel bars, 1.73c. to 1.78c.; plates, 1.73c. to 1.78c.; structural shapes, 1.73c. to 1.78c.; bar iron, 1.73c. to 1.88c. On export shipments the freight rate is 28.5c. per 100 lb. and the domestic rate 38c.

Warehouse Business.—Prices in the New York district are slightly weaker on most items, although official asking prices are unchanged. Undoubtedly warehouse prices here have been affected by the lower mill quotations now current and the recent weakness that prevailed for a brief period in the Philadelphia market. One Brooklyn warehouse, while maintaining current quotations, offers quantity reductions as follows: For 20,000 lb. or more, 13c. per 100 lb. off list price; 10,000 lb. or more, 10c. off list; and 5000 lb. or more, 5c. off list. On lots of 1000 to 2000 lb. an extra charge of 5c. per 100 lb. is made; on lots of 500 to 1000 lb., 10c. is made and on less than 500 lb. lots the charge per 100 lb. is 25c. Quotations on wrought iron and steel pipe are unchanged, but the market is weak and little new business is noted. Among brass and copper warehouses, business is generally active in materials involved in spring building operations, such as roofing, screening, etc. Recently there has been considerable business transacted with manufacturers of radio telephones. We quote prices on page 706.

High Speed Steel.—The market continues quiet and prices weak. A fair estimate of the present market is from 75c. to 85c. per lb. for 18 per cent tungsten high speed steel with prices on special brands of some companies ranging up to as high as \$1.05 per lb.

Cast Iron Pipe.—This market is extremely strong and increased operations are quite generally reported. There is noteworthy activity on the part of private purchases and the average number of municipal purchases. Bids will be opened March 9, by the Department of Water Supply, Gas and Electricity in New York, on 900 tons of 12-in. to 30-in. cast iron pipe. These bids are by contractors and call for the pipe installed. The 1200 tons of 12-in. to 24-in. cast-iron pipe for the Newburgh Water Department, Newburgh, N. Y., was awarded to the Warren Foundry & Machine Co. We quote per net ton, f.o.b. New York, carload lots, as fol-

lows: 6-in. and larger, \$47.30; 4-in. and 5-in., \$52.30; 3-in., \$62.30, with \$4 additional for Class A and gas pipe.

Old Material.—The general improvement in prices and feeling, manifest for the past fortnight or more, continues and is, if anything, stronger. Practically all steel mills show a greater interest in buying and are less inclined to hold to low prices in their offers. In many instances of late, sales prices have not kept pace with the increase in buying prices. It is reported that some sales have been consummated on delivered prices, which left no room for profit. No. 1 heavy melting steel shows another increase of about 50c. per ton, \$8.50 to \$9 now being a fair estimate of the market. The average buying price to-day is probably about \$8.85 per ton, with some dealers going as high as \$9. Iron and steel pipe, 1 in. in diameter, not under 2 ft. long, seems fairly stationary at \$8.30 per ton, but a fair average of current buying is \$8 to \$8.25 per ton. The Midvale Steel & Ordnance Co., which was in the market about 10 days ago for forge fire, specifying light drop forge trimmings and bundled cotton ties and offering up to \$10.50, is believed to have purchased a small tonnage, but at a lower price.

Buying prices per gross ton, New York, follow:

Heavy melting steel, yard.....	\$8.50 to \$9.00
Steel rails, short lengths, or equivalent	8.50 to 9.00
Re-rolling rails	9.25 to 9.75
Relaying rails, nominal.....	27.00 to 28.00
Steel car axles.....	10.00 to 10.50
Iron car axles.....	17.50 to 18.50
No. 1 railroad wrought.....	9.50 to 10.00
Wrought iron track.....	8.50 to 9.00
Forge fire	4.75 to 5.25
No. 1 yard wrought, long.....	9.00 to 9.50
Cast borings (clean).....	7.00 to 7.50
Machine-shop turnings	5.25 to 5.75
Mixed borings and turnings.....	5.00 to 5.50
Iron and steel pipe (1 in. diam., not under 2 ft. long).....	7.75 to 8.25
Stove plate	10.50 to 11.00
Locomotive grate bars.....	9.50 to 10.00
Malleable cast (railroad).....	8.00 to 8.50
Cast-iron car wheels.....	10.50 to 11.00

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, follow:

No. 1 machinery cast.....	\$16.50 to \$17.00
No. 1 heavy cast (columns, building materials, etc.), cupola size.....	15.50 to 16.00
No. 1 heavy cast, not cupola size.....	15.00 to 15.50
No. 2 cast (radiators, cast boilers, etc.)	10.00 to 10.50

Cincinnati

CINCINNATI, March 7.

Pig Iron.—Several fair-sized tonnages were sold during the week, the largest being for 4000 tons taken by a West Virginia melter on the basis of \$19, southern Ohio furnace. A southern Ohio melter bought a round tonnage of Southern iron on the basis of \$15, Birmingham. Two sales of Northern iron, of 500 tons each, were made to central Ohio melters at \$18.50, Iron-ton, and an Indiana melter bought 100 tons from a lake furnace at a similar figure. A southern Ohio stove manufacturer purchased 150 tons of southern Ohio iron at \$19, base, and a number of carload orders were also booked at the same figure. There is very little inquiry, the largest being from a Tennessee melter for 1000 tons. Another Tennessee melter is inquiring for 100 tons, and a Cincinnati foundry wants a similar amount. Several inquiries mentioned in last report are still outstanding. Prices are on an average 50c. lower than last week. Southern Ohio iron is now quoted at \$18.50 to \$19, Iron-ton, and Southern iron at \$15 to \$15.50, Birmingham. The higher price on Northern iron is quoted where the furnace has a freight advantage, but in competitive territory the lower price prevails. On Southern iron \$15 can be done on round tonnages, though several furnaces are holding to \$15.50. Sarah furnace in southern Ohio will blow out shortly, and it is expected that Belfont will be blown in towards the latter part of the month.

Based on freight rates of \$4.50 from Birmingham and \$2.52 from Iron-ton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base).....	\$19.50 to \$20.00
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	20.00 to 20.50
Ohio silvery, 8 per cent sil.....	30.02
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	21.02 to 21.52
Basic, Northern	21.02
Malleable	21.52 to 22.02

Finished Material.—A steady improvement is reported in the demand for finished materials, sheets probably being the leader. Practically all of the orders booked are for immediate shipment and while some mills have opened their books for second quarter, very few orders are being placed for that delivery. Prices show very little change, 1.40c. being the ruling price on bars, shapes and plates, although it is said that an attractive tonnage could be placed at 1.35c. There appears to be a stiffening of prices in the wire market and while some weeks ago wire nails were available at less than \$2.40, Pittsburgh, this price now appears to be the minimum. A nearby jobber has an inquiry out for 3000 kegs of wire nails, and it is said that he was unable to develop a lower price than \$2.40 Pittsburgh. Barbed wire and woven wire fencing are in fair demand and some few carload orders were booked during the week. Reinforcing bars are also fairly active, as some building projects involving small tonnages are up for bids. In the structural field the only award of consequence was 100 tons for the Federal Reserve Bank building at Nashville, Tenn., the contract going to the Nashville Bridge Co. The Willing Co., Bellevue, Ohio, has been awarded the contract for the construction of a high school at Middletown, Ohio, involving about 200 tons of structural steel and 400 tons of bars. The only new inquiry of consequence is for a highway bridge in Mississippi, taking 400 tons. Bids closed March 1 for the Business Men's Club, Cincinnati, the Wilde Bank building at Indianapolis, and the Indianapolis Athletic Club building, but no information has been given out as to the result of the bidding. The Big Four on Feb. 27 closed bids for 81,200 tie plates, but, so far as reported, no award has yet been made. On this inquiry the Lundie Engineering Co. quoted \$37 per ton f.o.b. Indiana Harbor for open-hearth tie plates and \$40 per ton for 25 per cent copper. The Wheeling Steel Products Co. quoted \$35.40 per ton, f.o.b. Cincinnati, with \$3 additional for copper. The Illinois Steel Co. quoted \$35.10, f.o.b. Kankakee; the Cambria Steel Co., \$35.20, f.o.b. Cleveland; the Inland Steel Co., \$35, f.o.b. Blue Island; the Railroad Supply Co., \$34, f.o.b. Chicago; the Dilworth-Porter Co., \$37.80, f.o.b. Cleveland; the Inter-State Iron & Steel Co., \$38, f.o.b. East Chicago. Several fairly large inquiries for tin plate are now being figured on and it is expected that these will be closed within the next week or so.

Plant Operations.—Plant operations will show a slight gain during the week. The American Rolling Mill Co. is operating both plants at Middletown at capacity. The Newport Rolling Mill Co. will put on three additional mills, making a total of seven. The Andrews Steel Co. is preparing to resume operations and it is likely it will be running approximately 50 per cent of capacity within the next two weeks. Three open hearths and 10 sheet mills are in operation at the Whitaker-Glessner plant at Portsmouth, Ohio, and the Ashland division of the American Rolling Mill Co. will have two open hearths and its blooming mill in operation.

Old Material.—Scrap dealers report an increased inquiry from foundries, many of which have not bought for a year. More inquiry for steel scrap is also reported from Valley points, but the local market continues quiet. Prices are stronger, and dealers have advanced bundled sheets, heavy melting steel, steel rails for melting, railroad wrought, borings and turnings, machinery cast and iron axles fifty cents a ton.

We quote dealers' buying prices, f.o.b. cars:

Per Gross Ton			
Bundled sheets	.....	\$4.00 to	\$4.50
Iron rails	.....	11.50 to	12.00
Relaying rails, 50 lb. and up	.....	24.50 to	25.00
Rerolling steel rails	.....	10.00 to	10.50
Heavy melting steel	.....	9.00 to	9.50
Steel rails for melting	.....	9.00 to	9.50
Car wheels	.....	11.50 to	12.50
Per Net Ton			
No. 1 railroad wrought	.....	8.50 to	9.00
Cast borings	.....	3.50 to	4.00
Steel turnings	.....	2.30 to	3.00
Railroad cast	.....	11.50 to	12.00
No. 1 machinery	.....	13.50 to	14.00
Burnt scrap	.....	7.00 to	7.50
Iron axles	.....	15.50 to	16.00
Locomotive tires (smooth inside)	.....	9.00 to	9.50
Pipes and flues	.....	3.50 to	4.00

Warehouse Business.—Local jobbers report a very

fair week both as to the number of orders and the tonnage. Reinforcing bars continue as a leader, although there is also a fair demand for shapes and wire products. Cold-rolled steel is unusually quiet. No price changes have been made and jobbers continue to quote:

Iron and steel bars, 2.75c. base; hoops and bands, 3.35c. base; shapes and plates, 2.85c. base; reinforcing bars, 2.82 1/2c. base; cold rolled rounds, 1 1/2 in. and larger, 3.50c. base; under 1 1/2 in. and flats, squares and hexagons, 4c.; No. 10 blue annealed sheets, 3.60c.; No. 28 black sheets, 4.25c.; No. 28 galvanized sheets, 5.25c.; wire nails, \$2.75 per keg base; No. 9 annealed wire, \$2.60 per 100 lb.

Coke.—The coke market is not so active though prices are inclined to stiffen. Connellsville furnace coke is now quoted at \$3.50, ovens, and foundry at \$4.25 to \$4.75. Wise County coke is also up 25c. a ton, furnace, being quoted at \$4.25 to \$4.50 and foundry at \$5.25 to \$5.50. New River is firm at \$7.50.

St. Louis

ST. LOUIS, March 7.

Pig Iron.—The pig iron market has shown more activity the last week than at any time this year. There has been more buying and inquiries have been more plentiful. Carloads and up to 100 tons have formed the bulk of the business, but some good sized orders have been placed and are pending. The market for Northern iron is firm at \$20, Chicago, that price being well established. Southern iron is being sold at \$15 to \$16 Birmingham, the latter price being made by a producer who has been selling on a basis of \$16 Sheffield, which has a freight rate of 80c. a ton less than Birmingham. This concern has thus virtually withdrawn its water and rail quotation temporarily. A few more sales were made the last week on the basis of \$19.44 St. Louis for water and rail shipment from Sheffield, and while it produced about all the business to be had here, that all was rather disappointing to the Sheffield interests that made the combination rate, being about 2000 tons. In Northern iron local interests bought 500 tons of basic and 1000 tons of foundry. Another sale of 150 tons of malleable was made locally, and several western Missouri and eastern Kansas melters bought carloads up to 150 tons of foundry iron. A Pacific Coast melter bought 100 tons here. There is an inquiry pending for 1000 to 2000 tons of malleable for a Mississippi River melter. A Pacific Coast melter wants 1000 tons and a Missouri interest is in the market for 2000 tons of foundry iron. A central Illinois melter is in the market for 500 tons, a Kansas melter wants 400 tons and a local melter wants 300 tons, and there are two inquiries for 500 to 1000 tons each from two Indiana foundries. An Atchison, Kan., melter is in the market for 500 tons of foundry iron. Two cars of 80 per cent ferromanganese were sold this week on the basis of \$62.50 New Orleans, and the Commonwealth Steel Co. wants a car of 12 to 13 per cent ferrosilicon.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices \$2.80 freight from Chicago and \$5.74 from Birmingham:

Northern foundry, sil.	1.75 to 2.25	\$22.80
Northern malleable, sil.	1.75 to 2.25	22.80
Basic	.....	22.80
Southern foundry, all rail, sil.	1.75 to 2.25	20.74 to 21.74

Finished Iron and Steel.—The demand for finished iron and steel products is improving, one concern reporting the best week for many months. Several carloads of reinforcing bars were sold to jobbers, and local fabricators bought some structural steel on the basis of \$1.40 Pittsburgh. There still is very little being done locally in the structural field because of the failure of labor and the master builders to get together on a wage adjustment. Interest is being shown here in the Indianapolis Athletic Club, involving 1500 to 1600 tons of structural steel, of which Roberts, Frost & Daggett of that city are the architects. Bids will be opened April 15 for the Fort Madison, Iowa, school to cost \$265,000. The railroads are entering the market again. The Missouri Pacific Railroad, which last week bought 20,000 tons of rails, made a purchase this week of 1250 kegs of track bolts and 2200 kegs of track spikes. Owing to an error of the telegraph operator, the rail tonnage was reported as 200,000 in THE IRON AGE of March 2. The Wabash Railroad is

in the market for 160,000 tie plates for 70, 80 and 90 lb. rails, and the Missouri, Kansas & Texas Railroad wants 350,000 tie plates for from 56 to 80-lb. rails.

For stock out of warehouse we quote: Soft steel bars, 2.22½c. per lb.; iron bars, 2.62½c.; structural shapes, 2.72½c.; tank plates, 2.72½c.; No. 10 blue annealed sheets, 3.17½c.; No. 28 black sheets, cold rolled, one pass, 4.15c.; cold drawn rounds, shafting and screw stock, 3.65c.; structural rivets, \$3.52½ per 100 lb.; boiler rivets, \$3.62½; tank rivets, 7/16-in. and smaller, 65 and 5 per cent off list; machine bolts, large, 60-10 per cent; small, 60, 10 and 10 per cent; carriage bolts, large, 55-5 per cent; small, 60 and 10 per cent; lag screws, 65-15 per cent; hot pressed nuts, square or hexagon blank, \$4; and tapped, \$3.75 off list.

Coke.—The market for coke is showing more activity, although most of the buying is for from a carload up to 125 tons. The most favorable feature is the increase in shipping specifications against contracts, especially among manufacturers of water gas. Foundries, too, are buying more freely, although the fear of a coal strike has not produced any very heavy buying.

Old Material.—The market for old material looks brighter, and there is a somewhat more bullish feeling among the dealers, a condition due to one of the large consumers having sent a representative on a tour of inspection to all the yards in the district looking for special grades of heavy melting steel; consequently the dealers are absorbing all railroad offerings at advancing prices. While the consensus of opinion is that better prices are just ahead, still, due to lack of actual buying by consumers, most of the grades remain at present quotations, the only exceptions being a few special items. The only railroad offering before the market is a list issued by the Pennsylvania—Southwestern region—calling for about 4000 tons.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton

Old iron rails.....	\$14.00 to \$14.50
Steel rails, rerolling.....	11.00 to 11.50
Steel rails, less than 3 ft.....	12.50 to 13.00
Relaying rails, standard section.....	23.00 to 28.00
Cast iron car wheels.....	13.50 to 14.00
No. 1 heavy railroad melting steel.....	10.00 to 10.50
No. 1 heavy shoveling steel.....	9.75 to 10.00
Ordinary shoveling steel.....	9.50 to 10.00
Frogs, switches and guards, cut apart.....	10.00 to 10.50
Ordinary bundle sheet.....	4.00 to 4.50
Cast steel bolsters.....	10.50 to 11.00

Per Net Ton

Heavy axles and tire turnings.....	6.00 to 6.50
Iron angle bars.....	13.00 to 13.50
Steel angle bars.....	9.00 to 9.50
Iron car axles.....	18.00 to 18.50
Steel car axles.....	12.50 to 13.00
Wrought iron arch bars and transoms.....	15.00 to 15.50
No. 1 railroad wrought.....	9.50 to 10.00
No. 2 railroad wrought.....	8.50 to 9.00
Railroad springs.....	11.00 to 11.50
Steel couplers and knuckles.....	11.00 to 11.50
Locomotive tires, 42 in. and over, smooth inside.....	8.00 to 8.50
No. 1 dealers' forge.....	8.00 to 8.50
Cast iron borings.....	5.50 to 6.00
No. 1 busheling.....	8.50 to 9.00
No. 1 boilers cut in sheets and rings.....	6.00 to 6.50
No. 1 railroad cast.....	13.50 to 14.00
Stove plate and light cast.....	11.50 to 12.00
Railroad malleable.....	9.50 to 10.00
Agricultural malleable.....	9.50 to 10.00
Pipes and flues.....	7.50 to 8.00
Heavy railroad sheet and tank.....	5.50 to 6.00
Light railroad sheet.....	3.50 to 4.00
Railroad grate bars.....	10.00 to 10.50
Machine shop turnings.....	3.00 to 3.50
Country mixed iron.....	6.00 to 6.50
Uncut railroad mixed.....	7.00 to 7.50
Horseshoes.....	9.50 to 10.00
Railroad brake shoes.....	9.50 to 10.00

The "Boost Bridgeport" committee of the Chamber of Commerce of Bridgeport, Conn., is contemplating the erection of a large loft building in the very near future for use of the small manufacturing industries which do not need, or cannot afford, buildings and plants of their own.

United States Civil Service examinations are to be held for information assistants under the Federal Board for Vocational Education. Salaries offered range from \$2,400 to \$3,600. Applications must be filed with the Commission at Washington on or before March 28.

Philadelphia

PHILADELPHIA, March 7.

The Jones & Laughlin Steel Co. to-day notified its customers in this district of an advance in prices on plates, shapes and bars to 1.50c., Pittsburgh, effective immediately. This action comes as an aftermath to two or three weeks of extremely low prices, during which time orders were taken at 1.30c., Pittsburgh, and in one or two instances at even lower figures. It is understood that all low quotations have been withdrawn except where protection was given for a specified period. The Jones & Laughlin Steel Co. is reported to have booked sufficient tonnage for two months' operation at 60 per cent of capacity and fear of a coal strike on April 1 brought about a cessation of its aggressive selling policy of the past few weeks. The local sales office of the Carnegie Steel Co. has also notified some of its customers of a prospective advance to 1.50c., Pittsburgh, on plates, shapes and bars, but it is not understood that this announcement has yet been officially made at the Pittsburgh headquarters of the company.

As a result of these advances, other steel companies are adopting a little firmer attitude on prices and before the week ends steel prices generally, it is predicted, may stiffen considerably. To-day, however, it appeared that orders for plates, shapes and bars could still be placed with some makers at 1.35c., Pittsburgh, though indications were that buyers would not find it easy to do 1.30c. even on very attractive business.

Pig iron prices have also stiffened. Three Eastern furnace interests which made a drive for business week before last at \$19 for No. 2 plain and \$19.50 for No. 2X, furnace, have advanced quotations to \$20 and \$20.50, but it is still possible to buy No. 2 plain at \$19.50, furnace, and No. 2X at \$20.

Steel plant operations show a slight increase. The Cambria works of the Midvale Steel & Ordnance Co. will put on two blast furnaces within 10 days, making five out of 11 in operation. The Bessemer steel works will also be started at the same time.

There has been a general advance in prices on old material, due mostly to higher prices and more active buying at Pittsburgh.

Pig Iron.—Three eastern Pennsylvania blast furnace interests, which lowered their prices \$1 a ton on foundry grades week before last in a drive for business which netted a total of 50,000 to 60,000 tons, have advanced their quotations \$1 and are now quoting \$20, furnace, for No. 2 plain and \$20.50 for No. 2X. It is still possible, however, to buy No. 2 plain at \$19.50 and No. 2X at \$20, furnace. Considerable business was closed during the past week at the low prices, principally in the New York district, but to-day the three leading sellers were firmly quoting the higher prices. Most all of the available business seems to have been closed and current inquiries are mostly for small lots for immediate shipment. The tonnage which has been put on furnace books within the past two weeks was not all for early shipment, some of it running throughout second quarter. However, the furnaces are fairly well off for this month and their attitude at present is to await developments in the threatened coal strike set for April 1. A small tonnage of malleable iron has been sold by an eastern Pennsylvania furnace at \$22, furnace. Low phosphorus iron is inactive and prices are unchanged. There is no demand for basic.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia, and include freight rates varying from 84 cents to \$1.54 per gross ton.

East. Pa. No. 2 plain, 1.75 to 2.25 sil.....	\$20.76 to \$21.26
East. Pa. No. 2X, 2.25 to 2.75 sil.....	21.26 to 21.76
Virginia No. 2 plain, 1.75 to 2.25 sil.....	26.24 to 26.74
Virginia No. 2X, 2.25 to 2.75 sil.....	27.24 to 27.74
Basic delivery eastern Pa.....	19.84
Gray forge.....	20.50 to 21.00
Malleable.....	22.50 to 24.00
Standard low phos. (f.o.b. furnace).....	20.00
Copper bearing low phos. (f.o.b. furnace).....	28.00

Ferroalloys.—Very little ferromanganese has been sold in the past week. There is practically no business in the British alloy, as sales are subject to increase in the duty. Prices remain at \$62.50, seaboard, for both

domestic and imported. Spiegeleisen is nominally held at \$30, furnace, for the 16 to 19 per cent.

Semi-Finished Steel.—Only occasional sales of billets are being made, prevailing prices being \$28, Pittsburgh, for rerolling and \$32 for forging quality, with \$1 a ton higher for small lots. Sheet bars are quoted at \$29, Pittsburgh, but \$28 could undoubtedly be done on an attractive tonnage.

Plates.—The price situation on plates to-day appeared somewhat firmer due to the advance to 1.50c., Pittsburgh, by the Jones & Laughlin Steel Co. and the indication that the Carnegie Steel Co. would also announce the same quotation. While it appeared more difficult to place plate orders at 1.30c., Pittsburgh, at which business has been done in the past two or three weeks, it was possible to-day to obtain quotations of 1.35c. Just to what extent other mills will follow the advance to 1.50c. remains to be seen, but it is predicted that quotations below 1.35c. and possibly below 1.40c., Pittsburgh, may entirely disappear before the end of the week. All sellers are not sanguine, however, that a marked improvement in the price situation will immediately result. Eastern plate mills are operating at a slightly better rate. The Standard Oil Co. is reported to have placed 1000 tons for its Bayway, N. J., plant. The Norfolk & Western Railroad has issued an inquiry for 2000 to 4000 70-ton steel freight cars. The Delaware, Lackawanna & Western Railroad has divided 985 cars for repair between the American Car & Foundry Co. and the Magor Car Corporation. The Baltimore & Ohio has withdrawn its inquiry for 50 passenger, mail and baggage coaches because of inability to obtain deliveries in time for the summer excursion traffic. We quote sheared and universal plates at 1.35c. to 1.40c., Pittsburgh.

Structural Material.—Steel for the new Philadelphia public library, amounting to 4300 tons, is reported to have been placed with the American Bridge Co. Considerable new work is being talked of, but most of it is still in the estimating stage. Structural shapes are possibly a trifle firmer in price, but the market can still be quoted at not over 1.35c. to 1.40c., Pittsburgh.

Bars.—Orders for steel bars continue in fair volume, with most of the business being taken at not more than 1.35c., Pittsburgh. Bar iron is now available at the same figure, but business is extremely limited.

Old Material.—Although scrap business in the East has not materially increased, greater activity and higher prices in the Pittsburgh district have given this market a much firmer tone. Such sales as have been made in eastern Pennsylvania are at advancing prices and the market this week is about 50c. a ton higher on nearly all grades. The Bethlehem Steel Co. has paid \$13.50, delivered Steelton, Pa., but at steel plants nearer to Philadelphia steel scrap has been offered as low as \$12, delivered. The steel scrap on the recent list of the Pennsylvania Railroad is reported to have been sold at \$14.60, delivered at western Pennsylvania steel plants. We quote for delivery at consumers' works in this district as follows:

No. 1 heavy melting steel.....	\$12.00 to \$13.00
Scrap rail	12.00 to 13.00
Steel rails, rerolling.....	15.00 to 15.50
No. 1 low phos., heavy 0.04 and under	18.00 to 19.00
Cast iron car wheels.....	16.00 to 16.50
No. 1 railroad wrought.....	15.00 to 15.50
No. 1 yard wrought.....	12.50 to 13.00
No. 1 forge fire.....	10.00 to 10.50
Bundled sheets (for steel works)...	10.00 to 10.50
No. 1 busheling.....	11.50 to 12.50
No. 2 busheling.....	9.00 to 10.00
Turnings (short shoveling grade for blast furnace use).....	10.00 to 10.50
Mixed borings and turnings (for blast furnace use).....	10.00 to 10.50
Machine-shop turnings (for rolling mill and steel works use).....	10.50 to 11.00
Heavy axle turnings (or equivalent)	11.00 to 11.50
Cast borings (for steel works and rolling mills).....	12.00 to 12.50
Cast borings (for chemical plants)...	14.50 to 15.00
No. 1 cast.....	17.00 to 17.50
Railroad grate bars.....	14.00 to 14.50
Stove plate (for steel plant use)....	14.00 to 14.50
Railroad malleable	13.00 to 13.50
Wrought iron and soft steel pipes and tubes (new specifications).....	13.00 to 13.25
Iron car axles.....	No market
Steel car axles.....	17.00 to 18.50

Track Supplies.—The Pennsylvania Railroad will probably place orders this week for 100,000 to 200,000

tie plates (1000 to 2000 tons), 500,000 lb. of railroad spikes and 100,000 heat-treated track bolts.

Warehouse Business.—Local jobbers have reduced prices on steel bars and small shapes, round edge iron and steel, tank steel plates, deformed steel bars, hoops and bands. We now quote for local delivery as follows:

Soft steel bars and small shapes, 2.40c.; iron bars (except bands), 2.50c.; round edge iron, 2.60c.; round edge steel, iron finish, 1½ x ½ in., 2.60c.; round edge steel planished, 3.35c.; tank steel plates, ¼-in. and heavier, 2.40c.; tank steel plates, 3/16-in., 2.55c.; blue annealed steel sheets, No. 10 gage, 3.50c.; light black sheets, No. 28 gage, 4c.; galvanized sheets, No. 28 gage, 5c.; square twisted and deformed steel bars, 2.40c.; structural shapes, 2.50c.; diamond pattern plates, ¼-in., 4.60c.; 3/16-in., 4.785c.; ½-in., 4.90c.; spring steel, 4.10c.; round cold-rolled steel, 3.25c.; squares and hexagons, cold-rolled steel, 3.75c.; steel hoops, No. 13 gage and lighter, 3.15c.; steel bands, No. 12 gage to 3/16-in., inclusive, 3c.; iron bands, 3.90c.; rails, 2.75c.; tool steel, 8c.; Norway iron, 5c.; toe steel, 4.50c.

Sheets.—Prices are firm, 2.25c. for blue annealed, 3c. for black and 4c. for galvanized, Pittsburgh, being quoted by all makers. Tin plate is usually quoted at \$4.60, Pittsburgh, but on large lots \$4.50 can be done.

LOWER EXTRAS ON WIDE PLATES

Lukens Steel Co., Makes Reductions Up to \$40 a Ton on Its Product

The Lukens Steel Co., Coatesville, Pa., which has the only mill in the country rolling extra wide plates, has issued a new card of extras on wide plates, putting into effect reductions which amount to as much as \$40 a ton on plates 190 to 195 in. wide. Cutting extras are entirely eliminated in the new card. The extra on widths over 190 in. to 195 in. is reduced from 4c. to 2c. per lb.; on widths from 170 to 185 in., the former extras ranged from 3c. to 3.75c. per lb., while the new extra on these widths is 1.50c. per lb.; from 155 to 170 in., the former extra ranged from 2.25c. to 2.75c., while the new extra for all of these widths is 1.25c. per lb.; widths from 140 to 155 in., which formerly took extra of from 1.50c. to 2c. per lb., now take an extra of 1c. per lb.; on 130 to 135 in., the former extra was 1c. and on 135 to 140 in., 1.25c., while the new card gives 0.75c. as the extra on widths from 130 to 140 in.

Alabama Pig Iron Stocks Decline

BIRMINGHAM, ALA., March 7.—Alabama iron yard stocks show a decrease of 23,000 tons. Stocks on yards Feb. 1 and March 1 were as follows: Feb. 1, 82,000 and 73,000 tons; basic 27,000 and 21,000; warrants, 800 and 700; machine cast, 46,000 and 38,000; total stocks, 157,000 and 134,000.

The Stanley Iron Works, Bridgewater, Mass., signifies its intention of resuming operations this week. The plant has been closed a week or so. A reduction in wages of molders, amounting to 20 per cent, was followed by a strike.

The number of employees at the General Electric Co., Pittsfield, Mass., has been increased 12 per cent during the past three months and the plant is running 46 per cent of normal. While domestic business continues to increase, foreign orders have been the salvation of the company.

Within the next few months, the New London Ship & Engine Co., New London, Conn., will install new engines and shafts in six submarines and later will do similar work on 12 others.

The wage scale of some 650 employees of the Hendee Mfg. Co., Springfield, Mass., motorcycles, has been reduced 15 per cent.

Several departments of the Stevens-Duryea Co., Chicopee, Mass., automobiles, have been placed on a half-time basis.

The Royal Typewriter Co., Hartford, Conn., has increased its operating schedule 15 per cent. Many of its employees are now on full time.

British Iron and Steel Market

Labor Deadlock Hampering Home Trade—Shipments to Continent Expanding—Beams and Ship Plates Higher

(By Cable)

LONDON, ENGLAND, March 7.

DUE to the deadlock in the engineering and ship-building trades, because of the dispute with regard to overtime payments and the withdrawal of the war bonus, a decrease has resulted in the home business in pig iron. The export demand is improving and there have been further sales to Continental destinations. Makers are well booked over March and prices are firm.

Hematite sales have decreased. Buyers are disinclined to pay the increased prices. Makers' order books are well filled. East Coast mixed numbers have been sold at £4 19½s. (\$21.89). Sellers are now asking £5 (\$22).

Best Bilbao Rubio ore is now held at 26½s. (\$5.83) ex-ship Tees, nominal. Coke is easier.

Finished steel trades are threatened by an industrial upheaval. The works are badly in want of orders, but prices are still held, owing to the uncertainty of future costs. Home and export demand is still slow.

Belgian merchant bars are being sold at £8 to £8 10s. (1.57 to 1.67c. per lb.) f.o.b., May and June delivery. French merchant bars are held at the same quotation. Luxemburg merchant bars are quoted at £8 2½s. to £8 7½s. (1.60 to 1.65c. per lb.) f.o.b., April and May shipment.

Belgian angles are held at £7 10s. to £7 12½s. (1.47 to 1.50c. per lb.) f.o.b. Luxemburg steel beams are quoted at £7 10s. to £7 15s. (1.47 to 1.52c. per lb.) f.o.b., for June delivery. Belgian 3/16-in. plates are held at £9 (1.77c. per lb.) c.i.f. India. Belgian sheet bars may be had at £6 10s. to £6 12½s. (\$28.60 to \$29.15) f.o.b., for March shipment. Luxemburg billets are obtainable at £7 (\$30.80) f.o.b., March and April.

Tin plates are steady, but there is little business passing. Welsh manufacturers are not yet disturbed over the acid workers' strike. Cheap offerings of Continental tin plate bars have been made, but buyers are chary of placing orders.

We quote per gross ton, except where otherwise stated, f.o.b. maker's works, with American equivalent figured at \$4.40 per £1 as follows:

Durham coke, delivered	£1 9s.	\$6.38
Cleveland No. 1 foundry	4 15	20.90
Cleveland No. 3 foundry	4 10	19.80
Cleveland No. 4 foundry	4 7½	19.25
Cleveland No. 4 forge	4 10	19.80
Cleveland basic	4 10	19.80
Hematite	7 0*	30.80*
East Coast mixed	5 0 to 5 2½	22.00 to \$22.55
Perromanganese	15 0 & 14 10*	66.00 & 63.80*
Rails, 60 lb. and up	8 0 to 9 10	35.20 to 41.80
Billets	7 0 to 7 10	30.80 to 33.00
Sheet and tin plate bars, Welsh	7 0 to 7 7½	30.80 to 32.55
Tin plates, base box	0 18½ to 0 19	4.07 to 4.18
C. per Lb.		
Ship plates	9 5 to 10 10	1.82 to 2.06
Boiler plates	12 10 to 14 0	2.46 to 2.75
Tees	9 10 to 11 0	1.87 to 2.15
Channels	8 15 to 10 5	1.72 to 2.01
Beams	8 10 to 10 0	1.67 to 1.96
Round bars, ¾ to 3 in.	10 10	2.06
Galvanized sheets, 24 g.	15 15 to 16 0	3.09 to 3.14
Black sheets	12 10 to 13 0	2.46 to 2.55
Steel hoops	12 0 & 12 5*	2.36 & 2.41*
Cold rolled steel strip, 20 g.	23 10	4.62

*Export price.

Revival Slow — Pig Iron Demand Light — Further High-Speed Steel Stocks

LONDON, ENGLAND, Feb. 8.—The long-looked for revival has not yet made its appearance, to the disappointment of all concerned. It cannot be said with

any confidence that the corner has been turned. Certainly, there has been considerable improvement in pig iron during the past week or so, but this is only a minute proportion of the normal trade. The whole trouble, of course, is high prices, which consumers all over the world are not disposed to pay, and though the process of deflation has continued steadily for many months, prices have not yet got down to an economic level. Various wage reductions have been made recently which, of course, help to cheapen production, but there is still the question of fuel and railroad transport, and consumers of steel in this country assert that it is not so much the high price they have to pay which is a hindrance to substantial business as it is the cost involved in the handling of material afterward and in working it up for their own purposes. A certain amount of export business is, of course, moving, and in one or two instances low prices have been taken, but the works involved now appear to have sufficient orders to cope with their present limited output and are consequently slightly stiffer. On the other hand, continental quotations are advancing, and deliveries becoming more and more in arrears, so that buyers hesitate from committing themselves into such contracts.

Home consumers of pig iron are simply purchasing from hand to mouth, while export sales are small but include a few lots to Germany. No alterations have been made in Cleveland quotations, No. 3 G. M. B. being obtainable at 90s. for either home or export, but buyers are confident that before long they will be able to obtain all they want for less money, and are therefore holding off as long as possible.

Hematite continues in fair demand, South Wales and Sheffield being the prominent purchasers for the home trade, although by no means in any substantial degree, while for export Germany has bought a little. Prices, however, are weak, as makers want the orders and East Coast Mixed Nos. can be obtained for about 90s. There are in the Cleveland district 27 furnaces now working, and of these seven are on foundry and 12 on hematite pig iron, and the remainder on basic and special.

In finished iron and steel, North Eastern and Scotch makers have decided no longer to compete against each other for ship plates and shapes, and have re-established the fixing of minimum quotations for the home trade. Ship plates are accordingly offered at £10 10s., delivered, and shapes at £10, delivered. Apart from this, the market generally is dull and uninteresting.

On top of the recent throwing on the market of a large quantity of high-speed tool steel by the government, comes a discovery of further quantities at Constantinople, thus causing additional uneasiness to Sheffield producers. The quantity involved is in the neighborhood of 100 tons and consists in the main of 18 and 14 per cent tungsten material, which was shipped for munition making in Russia and is offered exactly as it left the works here several years ago.

Youngstown View of Advance

YOUNGSTOWN, March 7.—Independents believe the advance on bars, shapes and plates to 1.50c. by the Jones & Laughlin Steel Co., Pittsburgh, will help stabilize the market. The new minimum will be recognized by Valley interests, which have heretofore been accepting bar and plate tonnage at 1.40c. The general effect will be to strengthen prices, producers believe.

Receivers for the Pittsburgh Railways Co., have asked authority in the Federal Court to spend \$400,000 for 40 new all steel cars, money for which is available or will be available before the completion of the order, which is expected to go to the Pressed Steel Car Co. Motors are to be furnished by the Westinghouse Electric & Mfg. Co.

The Timken Roller Bearing Co., Canton, Ohio, has added 200 men to its force and is now operating its plant at from 60 to 70 per cent capacity.

FAR EAST INQUIRIES FOR BARS

Pipe for China—Quotations Asked on 10,000 Tons of Second Hand Plates

NEW YORK, March 7.—The Chinese market is beginning to show considerable improvement, evidently in sympathy with the increased activity of Japanese buying. Purchases by merchants in Japan continue on an upward trend and Chinese merchants also are beginning to inquire, with the evident intention of buying. Among recent Chinese purchases in the United States has been 2000 kegs of checker-head, counter sunk wire nails, which were reported to have gone at 3.65c. per keg, c.i.f. Chinese port. Some business has also been transacted in wire, black and galvanized sheets and bars. An inquiry is current from Chinese interests for about 10,000 tons of Matheson joint, 16-in. steel pipe and another inquiry, being handled by A. G. De Sherbinin & Co., 60 Broadway, New York, calls for 10,000 tons of second-hand steel plates, for April, May and June delivery. The offering price of the exporter is reported to be \$25 per ton.

Inquiry for bars by both Chinese and Japanese merchants continues to increase. Orders up to 500 tons are reported to have been placed and several inquiries are current. Sizes are generally confined to $\frac{1}{2}$ in. and smaller. German competition in Far Eastern markets on bars and structural material is reported to be confined to only the smallest sizes, the larger bars being quoted lower by American mills.

An inquiry for fabricated pipe for Calcutta, India, received by way of London, asks for quotations on 5/16 and 7/16-in. steel plates for 33-in. and 60-in. pipe, totaling about 4000 tons for a 6-mile line. It is understood that the fabrication is to be done in England, and as American mill prices are still rather high to compete

in England, it is doubted that the order could be closed here.

The recent activity in wire rod exports to Japan has evidently come to a temporary end with the slight stiffening of the American market, and the decline of that market in Japan. Recent sales of wire rods were made at \$47 per ton, c.i.f. (about \$33 mill) Japan, but at present sales are being consummated there at less than the American market price. Steel bar orders by Japanese merchants are reported by numerous exporters. One exporter is stated to have booked 1000 tons, another 500 tons and quotations were recently made by certain exporters on 3400 tons and on 2500 tons. Practically all were for small sizes. Although it has been reported that the Imperial Japanese Railways inquiry for 4730 tons of 20-lb. rails, with which was included 191 tons of 20-lb. rail splice bars and 6 tons of 16-lb. rail splice bars, was placed with the Asano Bussan Co., 165 Broadway, New York, no confirmation has as yet been received. The reported quotation on this order, c.i.f. Japanese port, was \$42.75 per ton.

The heavy black sheet buying of Japan, during the latter part of last year, evidently led to some speculation in the United States. Lower mill prices here and the recent light buying by Japan has brought a number of lots of both black and galvanized sheets upon the market. It is also reported that shipyards in Pennsylvania have been offering resale lots of black sheets in good condition at \$15 to \$16 per ton. Some mills are reported to be shading prices considerably on their standard brands of sheets, when quoting for export.

The leading independent steel export company reports a considerable gain for February, though tonnage figures are still very far from what may be considered a normal volume. Japan is buying consistently and South American countries have also come into the market to a greater extent.

Blast Furnace Investigations of Bureau of Mines

The blast furnace research section of the Bureau of Mines, located at Minneapolis, has carried out plant investigations for six years; these are being continued. The conviction has been forced on it, however, that little progress toward the solution of the many important problems involved in furnace operation will, or can, be solved by any method of study of commercial operations on account of the large amount of materials to be handled and the numerous causes of irregularities. The need of a furnace capable of operating on a small scale and under controllable conditions has been obvious for years. In the last year an experimental stack has been erected and twelve combinations of furnace lines and operating conditions tried out. This work is being continued.

One investigation covers the effect of furnace lines on blast furnace operations. The blast furnace works on the countercurrent principle; the ascending gas stream encountering the descending raw materials, with a regenerative transfer of heat. Maximum contact between gas stream and raw materials produces most rapid heat transfer and reduction of the ore. The degree of contact between gas stream and solid charge depends to a very large extent upon the size and shape of the furnace. About 200 furnaces are relined each year, most of the new lines being copies of previous unsatisfactory ones. The furnace designer, lacking practical rules governing the best shape of furnace, prefers to stick to known troubles rather than accept the risk of a new design. An investigation in the laboratory and in the experimental furnace is being carried on by the bureau with the hope to discover some fundamental principles which may be of use to the furnace designer.

Another investigation being conducted relates to the effect of physical characteristics of the charge on blast furnace operation. Probably the greatest cause of the fundamental inefficiency of the blast furnace, considered thermally as a furnace, is due to the enormous

disparity between the sizes of the particles of the solids charged. The average lump of coke has a volume of 400 to 800 c.c. and a surface exposed to the gas stream of 0.5 to 1 sq. cm. per gm. The average ore particle, on the contrary, has a volume approximately 0.000005 and would expose a surface of about 300 sq. cm. per gm. to the gas stream if its surface were exposed to the gas stream. A study is being made of the effect on furnace operation of a mixture of solid particles one-third of which is one hundred million times the size of the other two thirds. In a number of cases furnace operators have improved furnace efficiency by sizing the coke charge. There are prospects of being able to continue such work on the sizing, not only of the coke but of the ore.

The bureau is also conducting performance tests on various cokes in the blast furnace. Opportunities for obtaining rather complete data on coking conditions and coordinate information concerning the performance of this coke in the blast furnace are particularly good at this plant. Variations in the quality of the coke in commercial practice are sufficiently great to promise valuable data without instituting special coking conditions. Furnace irregularities from other causes probably will be difficult to eliminate. Chances of a successful study of data at this plant are better than at the majority of plants due to the simple and direct means there employed for the transfer of coke from the ovens to the furnace. In most plants the identity of individual coke heats is lost in transfer and storage of the coke.

The Worcester, Mass., Chamber of Commerce estimates the unemployed in that city as 8000, or 2000 less than was the case six months ago. At the peak of the business depression, more than 15,000 were out of employment in that city. The unemployment in the metal working and machine tool industries has grown considerably less during the past six months, largely because of the activity of steel company subsidiaries and of textile machinery accessories makers.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight Rates

Freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia, domestic..\$0.36	Kansas City.....\$0.815
Philadelphia, export... 0.265	Kansas City (pipe)... 0.77
Baltimore, domestic... 0.35	St. Paul..... 0.665
Baltimore, export..... 0.255	Omaha..... 0.815
New York, domestic... 0.33	Omaha (pipe)..... 0.77
New York, export..... 0.285	Denver..... 1.35
Boston, domestic..... 0.405	Denver (wire products) 1.415
Boston, export..... 0.285	Pacific Coast..... 1.665
Buffalo..... 0.295	Pacific Coast, ship plates 1.335
Cleveland..... 0.24	Birmingham..... 0.765
Detroit..... 0.325	Jacksonville, all rail.. 0.555
Cincinnati..... 0.325	Jacksonville, rail and water..... 0.46
Indianapolis..... 0.345	New Orleans..... 0.515
Chicago..... 0.38	
St. Louis..... 0.475	

The minimum carload to most of the foregoing points is 25,000 lb. To Denver the minimum loading is 40,000 lb., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item the rate applies to a minimum of 50,000 lb., and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 55c.; ship plates, 75c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 75c.; sheets and tin plates, 60c. to 75c.; rods, wire rope, cable and strands, \$1; wire fencing, netting and stretcher, 75c.; pipe, not over 8 in. in diameter, 75c.; over 8 in. in diameter, 2½c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in., on one or both legs, ¼ in. thick and over, and zees, structural sizes, 1.35c. to 1.40c.

Sheared plates, ¼ in. and heavier, tank quality, 1.35c. to 1.40c.

Wire Products

Wire nails, \$2.40 base per keg; galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of \$1.25 and shorter than 1 in., \$1.75; bright Bessemer and basic wire, \$2.25 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$2.25; galvanized wire, \$2.75; galvanized barbed wire, \$3.05; galvanized fence staples, \$3.05; painted barbed wire, \$2.55; polished fence staples, \$2.55; cement-coated nails, per count keg, \$1.90; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 70½ per cent off list for carload lots; 69½ per cent for 1000-rod lots, and 68½ per cent for small lots f.o.b. Pittsburgh.

Bolts and Nuts

Machine bolts, small, rolled threads, 70, 10 and 10 per cent off list
Machine bolts, small, cut threads, 70 and 10 per cent off list
Machine bolts, larger and longer, 70 and 10 per cent off list
Carriage bolts, ¾ in. x 6 in.:
Smaller and shorter rolled threads, 70 and 10 per cent off list
Cut threads..... 70 per cent off list
Longer and larger sizes..... 70 per cent off list
Lag bolts..... 70, 10 and 5 per cent off list
Flow bolts, Nos. 1, 2 and 3 heads, 60 and 10 per cent off list
Other style heads..... 20 per cent extra
Machine bolts, c.p.c. and t. nuts, ¾ in. x 4 in.:
Smaller and shorter..... 65, 10 and 5 per cent off list
Larger and longer sizes..... 65 and 10 per cent off list
Hot pressed sq. or hex. blank nuts..... \$5.50 off list
Hot pressed nuts, tapped..... \$5.25 off list
C.p.c. and t. sq. or hex. blank nuts..... \$5.25 off list
C.p.c. and t. sq. or hex. blank nuts, tapped..... \$5.00 off list
Semi-finished hex. nuts:
¾ in. to 9/16 in. inclusive, .80, 10, 10 and 10 per cent off list
Small sizes S. A. E..... 80 and 10 per cent off list
¾ in. to 1 in. inclusive, U. S. S. and S. A. E.,
70, 10, 10 and 10 per cent off list
Stove bolts in packages..... 80 and 3 tens and 5 per cent off list
Stove bolts in bulk..... 80, 3 tens and 2½ per cent off list
Tie bolts..... 70, 10 and 5 per cent off list
Track bolts, carloads..... 3c. base
Track bolts, less than carloads..... 4c.

Upset and Hex. Head Cap Screws

¾ in. and under..... 80 and 10 to 80, 10 and 10 per cent off list
¾ in. to 1 in. inclusive, 80 and 10 to 80, 10 and 10 per cent off list

Upset Set Screws

¾ in. and under..... 80, 10 and 5 to 85 per cent off list
¾ in. to 1 in. inclusive, 80, 10 and 5 to 85 per cent off list

Milled Square and Hex. Cap Screws

All sizes..... 75 and 10 to 80 per cent off list

Milled Set Screws

All sizes..... 70, 10 and 10 per cent off list

Rivets

Large structural and ship rivets..... \$2.00 to \$2.10
Large boiler rivets..... 2.10 to 2.20
Small rivets..... 75 and 10 off list

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, \$36; chain rods, \$36; screw stock rods, \$41; rivet and bolt rods and other rods of that character, \$36; high carbon rods, \$43 to \$46, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes, 9/16-in. and larger, \$2 to \$2.10 base per 100 lb. in lots of 200 kegs of 200 lb. each or more; spikes, ½-in., ¾-in. and 7/16-in., \$2.15 to \$2.25 base; 5/16-in., \$2.15 to \$2.25 base. Boat and barge spikes, \$2.15 to \$2.25 base per 100 lb. in carload lots of 200 kegs or more, f.o.b. Pittsburgh. Track bolts, 3c. base per 100 lb. Tie plates, \$1.75 per 100 lb. Angle bars, \$2.40 per 100 lb.

Terne Plates

Prices of terne plates are as follows: 8-lb. coating, 200 lb., \$9.30 per package; 8-lb. coating, 1 C., \$9.60; 15-lb. coating, 1 C., \$11.80; 20-lb. coating, 1 C., \$13; 25-lb. coating, 1 C., \$14.25; 30-lb. coating, 1 C., \$15.25; 35-lb. coating, 1 C., \$16.25; 40-lb. coating, 1 C., \$17.25 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars, 1.35c. to 1.40c. from mill. Refined bar iron, 2c. to 2.10c.

Welded Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card:

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
½.....	54½	28	¾ to 1.....	36½	18½
¾.....	60	33½	1.....	42½	27½
1.....	65	50½	1 to 1½.....	44½	29½
1½.....	69	56½			
2 to 3.....	71	58½			

Lap Weld

Inches	Black	Galv.	Inches	Black	Galv.
2.....	64	51½	2.....	39½	25½
2½ to 6.....	68	55½	2½ to 6.....	42½	29½
7 to 8.....	65	51½	7 to 12.....	40½	27½
9 to 12.....	64	50½			

Butt Weld, extra strong, plain ends

Inches	Black	Galv.	Inches	Black	Galv.
½.....	50½	33	¾ to 1.....	4½	37½
¾ to 1.....	56	38½	1.....	35½	23½
1.....	62	50½	¾.....	42½	28½
1½.....	67	55½	1 to 1½.....	44½	30½
2 to 3.....	69	57½			
	70	58½			

Lap Weld, extra strong, plain ends

Inches	Black	Galv.	Inches	Black	Galv.
2.....	62	50½	2.....	40½	27½
2½ to 4.....	66	54½	2½ to 4.....	43½	31½
4½ to 6.....	65	53½	4½ to 6.....	42½	30½
7 to 8.....	61	47½	7 to 8.....	35½	23½
9 to 12.....	55	41½	9 to 12.....	30½	18½

To the large jobbing trade the above discounts are increased by one point, with supplementary discounts of 5 and 2½ per cent.

Boiler Tubes

The following are the discounts for carload lots f.o.b. Pittsburgh:

Lap Welded Steel		Charcoal Iron	
1½ in.	26½	1½ in.	5
2 to 2½ in.	41	1¾ to 1½ in.	15
2½ to 3 in.	52	2 to 2½ in.	25
3½ to 13 in.	57	2½ to 3 in.	30
		3¼ to 4½ in.	32

To large buyers of steel tubes, a supplementary discount of 5 per cent is allowed.

Standard Commercial Seamless Boiler Tubes

New discounts have been adopted on standard commercial seamless boiler tubes, but manufacturers are not yet ready to announce them for publication, and for that reason we publish no discounts this week.

Sheets

Prices for mill shipments on sheets of standard gage in carloads, f.o.b. Pittsburgh, follow:

Blue Annealed		Cents per Lb.	
No. 8 and heavier.....	2.20	Nos. 11 and 12.....	2.30
Nos. 9 and 10 (base).....	2.25	Nos. 13 and 14.....	2.35
		Nos. 15 and 16.....	2.45
Box Annealed, One Pass Cold Rolled		Cents per Lb.	
Nos. 17 to 21.....	2.80	No. 28 (base).....	3.00
Nos. 22 to 24.....	2.85	No. 29.....	3.10
Nos. 25 and 26.....	2.90	No. 30.....	3.20
No. 27.....	2.95		
Galvanized		Cents per Lb.	
Nos. 10 and 11.....	3.00	Nos. 25 and 26.....	3.70
Nos. 12 to 14.....	3.10	No. 27.....	3.85
Nos. 15 and 16.....	3.25	No. 28 (base).....	4.00
Nos. 17 to 21.....	3.40	No. 29.....	4.25
Nos. 22 to 24.....	3.55	No. 30.....	4.50
Tin-Mill Black Plate		Cents per Lb.	
Nos. 15 and 16.....	2.80	No. 28 (base).....	3.00
Nos. 17 to 21.....	2.85	No. 29.....	3.05
Nos. 22 to 24.....	2.90	No. 30.....	3.05
Nos. 25 to 27.....	2.95	Nos. 30½ and 31.....	3.10

LABOR COMMENDED

Message to Employees of United Engineering & Foundry Co.—Conditions Reviewed

"Labor, generally speaking, is deserving of a large amount of credit for the commendable spirit manifested in accepting ungrudgingly the unavoidable wage reductions and for the better co-operation and higher standard of efficiency which, in the majority of cases, is clearly noticeable in the amount and quality of work turned out." This statement is contained in a message to employees at its various plants by the United Engineering & Foundry Co., Pittsburgh.

"Labor is coming to realize that the only way to relieve the unemployment situation is to put forth its best efforts toward elimination of waste, and toward increased efficiency, in order that the employer, by reason of the resultant lower production costs, may secure his share of business, which in turn means more employment. It is regrettable that all labor cannot see the vital need of co-operation between employer and employee.

"We cannot expect any considerable improvement in industry until fuel, as well as transportation, is cheaper. Many railroads are now farming out repair work which should and would be done by railroad labor, if their rates were not so far above those outside of the railroad service."

"There has been a slight upturn in general business," continues the statement, "and from present indications the improvement will continue slowly. A rapid recovery of business might result from unnatural or artificial means, but this would be dangerous and might

eventually lead to another crash similar to that experienced in 1920.

"Considering the fact that the noticeable, but slight, industrial improvement since the middle of last year represents, to a large extent, purchases for replacement or repair of worn-out equipment and buildings rather than new construction, we may safely look for a much larger volume of business this year, for the reason that in addition to a greater volume of purchases for replacement there will be a large demand for needed construction which has been pending for several years.

"Announcement has already been made that contemplated construction projects of a public utility nature as well as extensive improvements by large steel corporations and other businesses are to be prosecuted or started in the near future.

"Liquidation has progressed rapidly as is indicated by the large number of commercial failures in 1921. It is well to remember that too few failures during a business depression is a bad sign. Considering the fact that so many ill-conceived and inefficiently managed concerns entered the field of business during the period of the war, when the unlimited demand and crying need everywhere for materials made it possible for almost anyone to produce and market goods at a profit, the period of depression so far has been characterized by too low a percentage of failures to make for a healthy condition.

"There still exists a great deal of uncertainty as to whether the bottom has been reached in all lines of business. It is gratifying to note, however, that several indications now point to a slow but steady and substantial business improvement during the ensuing year and many business men are showing keen foresight by making preparations accordingly."

Iron Ore Rate Controversy Resumed

WASHINGTON, March 7.—Tariffs filed with the Interstate Commerce Commission on March 1 proposing a reduction of 28 per cent as of April 1 on iron ore from Eastern mines are to be followed at once, according to reports, by an effort to obtain a reduction of 14 per cent on April 1 on ex-lake rates. Provided the latter went into effect on the date mentioned, it would have to be through special permission of the commission. The 28 per cent reduction proposed on rates from Eastern mines, including those in Pennsylvania, New York and New Jersey, would mean the elimination of the 40 per cent increase effective on Aug. 26, 1920, while the proposed 14 per cent cut in rates from lower lake docks on Lake Superior ore would amount to the cutting off of one-half of the general 40 per cent advance.

These moves by the carriers again brings to the fore the contest between the lake front and interior iron and steel interests. Buffalo iron and steel producers have consistently opposed a reduction in rates on iron ore from lower lake ports to interior furnaces in the absence of reductions in rates on coal to the Buffalo district and in a complaint now before the commission have asked it to establish a minimum on rates on iron from lower lake ports and, going further, argue that present rates on such shipments are too low when compared with coal rates to Buffalo from Pennsylvania mines. It is therefore expected that the Buffalo producers will contest the proposed 28 per cent cut in ore rates from Eastern mines on the ground that it is an entering wedge to a move toward a cut in rates on ore from lower lake ports.

Conferences have been held during the past week between the railroads interested and the commission regarding the proposed 28 per cent reduction and it remains to be seen whether the commission will permit the lower rates to go into operation on April 1 or will suspend them. It also is expected that if the 14 per cent rate on ex-lake ore rates is proposed, as it is said will be done, conferences will be held with the commission, requiring action on this matter also. As is known, the temporary reduction of 28 per cent on ore rates from lower lake ports was eliminated on Jan. 1 of the present year and the lower rates, which applied last fall, suspended until April 1 and succeeded by the old

rates which became effective as the result of the general 40 per cent advance.

Cincinnati Section, National Metal Trades Association

The annual meeting of the Cincinnati section of the National Metal Trades Association was held at the Business Men's Club in that city on March 2. The principal speakers were W. W. Coleman of Milwaukee, George W. Cartwright, Philadelphia, and the Rev. John B. Ascham of Cincinnati. President J. B. Doan presided, and in his annual address stated that this country needed an organized force to successfully resist the oppression of misguided labor and the spirit of communism and that the National Association and all of its constituent organizations must not dilute their militant forces in the fight for the open shop. Mr. Coleman's remarks dealt with the labor situation in England, and he declared that organized labor in that country had brought it to the verge of industrial ruin. One of the most serious mistakes the United States could make would be to enact an unemployment insurance law. He declared that American industries of their own volition had accomplished far more for American labor than the British unions had accomplished for English labor.

Mr. Cartwright in his address advocated an educational reform to give the workman the proper perspective toward his work. He said there should be less of boards and co-operative legislation and that we in this country must avoid the troubles brought about through the gospels preached by the English unions. In Mr. Cartwright's opinion the present industrial depression was scheduled to arrive in 1914, but the war postponed it. Those who were first to retrench by stopping speculative credit extensions and curtailed production will be the first to recover without suffering too severe losses. The speaker asserted that it was the Federal Reserve Act more than any other thing that saved the United States from an unprecedented financial panic. The election of officers resulted as follows: President, J. Wallace Carrel; vice-president, E. A. Muller; secretary, N. C. Lamont; the executive committee will be comprised of the officers and P. O. Geier, A. B. Breeze and J. B. Doan.

Non-Ferrous Metals

The Week's Prices

Cents Per Pound for Early Delivery							
Copper, New York		Straits		Lead		Zinc	
		Electro-lytic*	Tin New York	New York	St. Louis	New York	St. Louis
March	Lake						
1.....	12.75	12.50	29.50	4.70	4.40	4.90	4.55
2.....	12.75	12.50	29.37½	4.70	4.40	4.90	4.55
3.....	12.87½	12.62½	29.50	4.70	4.40	4.95	4.60
4.....	12.87½	12.62½	.....	4.70	4.40	4.95	4.60
5.....	12.87½	12.62½	29.75	4.70	4.40	4.97½	4.62½
6.....	13.00	12.75	29.00	4.70	4.40	4.97½	4.62½

*Refinery quotation.

New York

NEW YORK, March 7.

An optimistic tone pervades all the markets and prices are advancing. The tin market has been quiet and prices are steady. Conditions in the lead market are unchanged. Sentiment and prices in the zinc market have improved.

Copper.—Not only have practically all of the cheaper offerings of copper been eliminated or withdrawn, but consumers are gradually becoming convinced that the bottom of the market on this movement has been reached. As a result buying in the last week or two has improved decidedly and the lower levels have disappeared. Electrolytic copper for early or 30-day delivery is quoted to-day at a minimum of 13c., delivered, or 12.75c., refinery, and it is doubtful if this could be shaded. Some sellers, however, will quote on this basis through May, while others confine themselves to more conservative limits as to delivery. Sales in February are estimated to have been about 100,000,000 lb., as contrasted with a little over one-half of this in January. The buying late in February and so far this month has been fairly heavy, both for domestic and foreign account, the latter being much better than a few weeks ago.

Tin.—The past week has been one of the quietest in some time. Only enough business in Straits tin has been done to establish a market and it is safe to say that the week's turnover has ranged from 500 to 600 tons and that on no one day was more than 150 tons dealt in. The chief cause of the inactivity has been an uncertainty on the part of buyers and sellers as to the meaning of the fluctuations in the London market and this has resulted in extreme caution on their part. Spot Straits tin was quoted to-day at 29c., New York, and in London spot standard was quoted at £142, future standard at £144 and spot Straits at £144 10s., all about £3 per ton less than a week ago, with the market reported weak. Deliveries of tin into consumption in February are reported to have been 3215 tons, with 506 tons in stock and 900 tons landing on Feb. 28. Imports for the first two months of this year have been 7200 tons, against 3830 tons for the same two months in 1921. Arrivals thus far this month have been 1205 tons, with 7935 tons reported afloat.

Lead.—The healthy conditions in this market continue, with demand maintained at the steady rate which has characterized it for so many weeks. The only change in price is that at St. Louis of the leading interest which now stands at 4.50c., instead of 4.70c., the New York quotation being unchanged at 4.70c. In the outside market the quotation of the independents is 4.70c., St. Louis, or 4.70c. to 4.75c., New York and Eastern points.

Zinc.—Prices of prime Western have advanced from 4.55c., St. Louis, a week ago, to 4.62½c. to-day for early or 30-day delivery, and the market is regarded as firm. This is due not so much to a large increase in demand as to the fact that producers have taken advantage of the slight increase in consumption to maintain a firm attitude as to offerings which they are willing to make. Quotations for future delivery are not freely obtained except at considerable increase.

Antimony.—Due to pressure to sell a few lots, the

market is lower at 4.20c., New York, duty paid, for wholesale lots for early delivery.

Aluminum.—The leading interest continues to quote wholesale lots of virgin metal, 98 to 99 per cent pure, for early delivery at 19c. to 19.10c., f.o.b. plant, depending on the quantity, and the same grade is offered by importers at 17c. to 18c., New York, duty paid.

Old Metals.—Prices are generally unchanged with business dull, though holders seem to be less inclined to sacrifice as has been the case during the past few weeks. Dealers selling prices are as follows:

	Cents Per Lb.
Copper, heavy and crucible.....	12.25
Copper, heavy and wire.....	11.50
Copper, light and bottoms.....	9.00
Heavy machine composition.....	9.50
Brass, heavy.....	7.25
Brass, light.....	5.75
No. 1 red brass or composition turnings.....	8.00
No. 1 yellow rod brass turnings.....	6.00
Lead, heavy.....	4.25
Lead, tea.....	3.25
Zinc.....	3.00

Chicago

MARCH 7.—Demand is light and prices show little change. A slight advance in tin reflects greater strength in the London market. It is to be noted that the London market last week was the lowest in 18 years. In this country lower than current prices were quoted last summer. But this was due to the exchange situation. Zinc has advanced principally because producers are holding back their metal in an effort to stiffen the market. Copper alone has shown evidences of real activity, buying in this market having been the best for several weeks. Old metal prices remain unchanged. We quote in carload lots: Lake copper, 13.25c.; tin, 32c.; lead, 4.50c.; spelter, 4.70c.; antimony, 6.50c., in less than carload lots. On old metals we quote: Copper wire, crucible shapes and copper clips, 9.50c.; copper bottoms, 7.50c.; red brass, 7.50c.; yellow brass, 6c.; lead pipe, 3.25c.; zinc, 2c.; pewter, No. 1, 22c. tin foil, 23c.; block tin, 25c.; all buying prices for less than carload lots.

St. Louis

MARCH 7.—Both lead and zinc are dull. We quote lead at 4.37½c., car lots, and slab zinc at 4.50c. On old material we quote: light brass, 3.50c.; heavy red brass, 7c.; light copper, 7c.; heavy yellow brass, 4c.; heavy copper and copper wire, 7.50c.; pewter, 15c.; tinfoil, 16c.; tea lead, 2c.; aluminum, 9c.

Investigation of the Alabama Iron Ore District

At the Southern Experiment Station of the Bureau of Mines, Birmingham-Tuscaloosa, Ala., the problem of the treatment of the iron ores of the Birmingham district has been divided into three parts as follows: (a) A detailed economic study will be made of the whole iron and steel industry in the Birmingham district, from the ore in the ground to the finished product. (b) What proportion of the gangue material associated with the iron ore of the district should be removed in ore dressing plants. (c) What proportion of the gangue of the iron ore of the district should be removed in the blast furnace for the most efficient practice.

A detailed study will be made of the methods of mining, handling and concentration of the ores, which will in turn be correlated with the studies on furnace practice and the use of coke best adapted to the treatment of the ores. The intention is to prepare a report covering the economic features of the iron ore industry of the Birmingham district, particularly with respect to the utilization of the siliceous ores that are not extensively used at the present time; also to ascertain whether it may not be possible to apply the information obtained as a result of this investigation to the mining, beneficiation and utilization of siliceous ores in other states, for example, in Tennessee and Missouri.

PERSONAL

Thomas C. Ham, who has been looking after the export business in the New York office of the Jones & Laughlin Steel Co., effective March 1, was made



THOMAS C. HAM

assistant manager of exports under A. H. Holliday, manager of exports. Mr. Ham will remain in the New York office. Mr. Ham was born in New Hampshire and is a graduate of Dartmouth College. He has been with the company since 1910, serving as assistant manager of sales in the wire department until 1919, when he was transferred to the New York office. Previously he was affiliated with the American Steel & Wire Co., first as manager of the Oklahoma City office of the company, and later as assistant manager, merchant trade

department, in the Chicago office.

Henry J. Kranz, who for the last 15 years has represented Carnegie Steel Co., Illinois Steel Co., and Tennessee Coal, Iron & Railroad Co. in Kansas and Oklahoma, has become associated with the Laclede Steel Co., St. Louis.

J. V. Emmons, Cleveland Twist Drill Co., gave an illustrated talk on the effect of structure upon the machining of tool steel, before the Boston Chapter American Society for Steel Treating, at the City Club, Boston, Wednesday, March 1.

Edward L. Pond, president Andrew Terry Co., Terryville, Conn., foundry, on March 4 observed the fiftieth anniversary of his connection with that company.

Frank S. Bradley, formerly secretary and general manager of the West Haven Mfg. Co., since its inception in 1896, has accepted the management of The Roberts Mfg. Co., New Haven, Conn., as its president.

The Pittsburgh Steel Co. announces the appointment of John F. Hazen as assistant general manager of sales. Mr. Hazen has been for several years connected with the sales end of the Pittsburgh Steel Co. in various capacities.

F. W. Pennock has resigned as vice-president and general manager of Cleaton Co. (of Canada), Ltd., and will hereafter be solely connected with Gelinas & Pennock, registered engineers, 207 St. James Street, Montreal.

Several changes in personnel were announced recently by the Westinghouse Electric & Mfg. Co. R. L. Rathbone, who has been manager of the Cleveland office, will take up special duties in connection with merchandising matters, with headquarters in Cleveland, and is succeeded by J. Andrews, Jr., who has been manager, industrial division, Pittsburgh office. C. D. Taylor succeeds Mr. Andrews in the Pittsburgh office. R. Seybold has been appointed manager of price statistics and will act as secretary of the domestic sales committee. W. R. Keagy has been appointed manager of the Cincinnati office and J. R. Deering manager of the Los Angeles office. H. S. Walker succeeds H. E. Lanning as promotion man in the Denver office and I. G. Cline takes the promotion work vacated by R. A. O'Reilly in the Chicago office. K. L. Graham succeeds to the post vacated by H. C. Hopkins as promotion man in the San Francisco office.

J. C. Miller, formerly manager, Columbus division, of the American Rolling Mill Co., has been transferred to Ashland, Ky., as manager of the Ashland division of the company, which property at present is comprised of

two blast furnaces, six 100-ton open-hearth furnaces and blooming mill, bar mill, and six sheet mills, and 22,000 acres of Kentucky coal property. He will also have the direction of the company's West Virginia coal properties, consisting of about 12,500 acres of gas coal in Fayette and Boone counties. In a recent reorganization of the Asland Coal & Iron Railway Co., also owned by the company, Mr. Miller was elected first vice-president and general manager, and also president of The Tygart Limestone Co. The company contemplates constructing additional finishing capacity during the present year.

Arthur Whitcraft, M.E., has assumed charge of the manganese steel sales department of The Hadfield-Penfield Steel Co. with headquarters at Bucyrus, Ohio. Mr. Whitcraft was for a number of years successively with the Marion Steam Shovel Co., American Locomotive Co., and New York Central Railroad, and he was for 12 years with the American Manganese Steel Co. as a sales engineer engaged in the design, application and sale of manganese steel castings.

L. J. Buck has severed his connection with the National Carbon Co., a subsidiary of the Union Carbide & Carbon Corporation, and has become United States sales representative of the British America Nickel Corporation, Ltd., Ottawa, Canada, with offices at the Canadian Pacific Building, 342 Madison Ave., New York. The British America Nickel Corporation is a Canadian organization with Sir Robert Borden as chairman of its board of directors and Hon. Edgar N. Rhodes president. It operates in the Sudbury district of mines with large quantities of proven ores of excellent quality and a modern smelter. Its refinery is located at Deschenes, near Ottawa.

D. K. Bullens, president D. K. Bullens Co., consulting metallurgist, Philadelphia, on March 7 addressed a joint meeting of the Pittsburgh sections of the American Steel Treating Society and American Institute of Mining and Metallurgical Engineers.

W. K. Singleton, formerly sales manager Carnahan Sheet & Tin Plate Co., now the Falcon Tin Plate & Sheet Co., has joined the sales force of the American Steel Co., Pittsburgh.

A. A. Potts has been elected secretary and treasurer and a director of the Pioneer Coal & Coke Co., Pittsburgh, and its subsidiary companies.

F. E. Fitzgerald, manager of sales Pioneer Coal & Coke Co., Pittsburgh, and affiliated companies, has been elected a director of the company and of the Tidewater Coal Co. and the National Transportations Co., subsidiaries.

President James A. Campbell of the Youngstown Sheet & Tube Co., Youngstown, Ohio, left Tuesday evening for a month's stay at Hot Springs, Ark.

William Bassett, as of March 1, retired from the Standard Supply & Equipment Co., Pittsburgh.

Samuel R. Robinson has resigned as foundry superintendent for the Sandusky Foundry & Machine Co., Sandusky, Ohio, to accept the position as metallurgist with the Lorain Steel Foundry Co., Lorain, Ohio. Mr. Robinson was metallurgist for the Philadelphia Roll & Machine Co., Philadelphia, from 1918 to 1921. Previous to that time he was metallurgist for 11 years for the Duquesne Steel Foundry Co., Corapolis, Pa.

It has been estimated that there were, July 1 last, 12,588,949 motor vehicles in the world, of which 10,505,660 were in the United States. No other country reaches 500,000, Great Britain being second with 497,582, Canada third with 463,448, France fourth with 236,146 and Germany fifth with 91,384. All of Europe is credited with 1,110,990, or rather less than New York and Pennsylvania combined.

It has been definitely shown by the Bureau of Standards that very accurate control of the temperature of molten metal is necessary in the determination of gases evolved in vacuo. The higher the metal is heated above its melting point the greater the quantity of gas evolved in a given time.

OBITUARY

LEWIS T. MILLER died at Pottsville, Pa., Feb. 26. He was born in Rochester, N. Y., Aug. 1, 1892, and lived the early part of his life around Rochester and Pittsburgh. After attending the University of Pittsburgh, he went to the Colonial Steel Co. at Colona, Pa., where he served in turn as inspector and assistant paymaster for four years. He was later with the Witherow Steel Co. as paymaster. He enlisted as a mechanic in the aviation section in September, 1917, was in service 22 months until July, 1919, when he was commissioned pilot in the Reserve Corps. After returning from service he again went with the Witherow Steel Co. as assistant district manager of its New York office and was later made district manager. He also served with the Hess Steel Corporation for a short time and with the International High-Speed Steel Co. as general superintendent of its Rockaway, N. J., plant. Since July, 1921, he had been connected with the National Steel Rolling Co., at Schuylkill Haven, Pa., as general superintendent, as well as being interested in work for Hartmann, Duncan & Rogow, Inc.

COL. JOHN LAMBERT, of Joliet, Ill., formerly president of the American Steel & Wire Co., died at his winter home, Pasadena, Cal., March 6, from complications following an attack of pneumonia. Col. Lambert's death ended an active business career, marked by a genius for organization in the field of iron and steel manufacture and distribution. He was born in Lambertville, N. J., Jan. 12, 1847, obtained a common school education and joined the Union forces in the Civil War in 1864. In 1879 at Joliet, Ill., the wire manufacturing firm of Lambert & Bishop was organized, one of the first producers of steel wire fencing in the country. With John W. Gates and Elbert H. Gary, Colonel Lambert was, years ago, one of the national figures in the organization of the steel industry, having been associated with them in the formation of the United States Steel Corporation. He leaves his widow and one daughter.

CAPT. HORACE G. H. TARR, widely known as an engineer of achievement, died unexpectedly March 2 at his home in Philadelphia. Captain Tarr was born in Chillicothe, Mo., in 1844, was educated at Andover Academy, enlisted in the Union Army when 16 years of age, and was soon promoted to captain. He made an admirable record. After the war he was engaged on a number of engineering projects and became associated with the Otis Elevator Co. He afterward became manager of the H. R. Worthington Pump Works, holding that position 17 years and resigning in 1901. At his death he was with the R. D. Wood Co., Philadelphia. He was a member of a number of engineering associations.

SOLOMON SHAW, for 52 years an expert in the iron and steel foundry business in Milwaukee, died Feb. 28 aged 73 years. He was born in Dudley, England, Oct. 1, 1848, and came to the United States in 1868. Mr. Shaw developed many new ideas in molding practice.

JOSEPH HEWES SHEPHERD, mechanical engineer, Blanchard Machine Co., Cambridge, Mass., died March 2 at his home in Needham Highlands. Mr. Shepherd was born in Arlington, Mass. His first business association was with the Baldwin Locomotive Works.

HENRY W. BULLARD, treasurer Poughkeepsie Foundry & Machine Co., Poughkeepsie, N. Y., died Saturday, Feb. 4.

JOHN SARGEANT of Domhoff & Joyce, pig iron brokers, Cincinnati, died last Saturday, March 4, at Buffalo, where he had been receiving treatment for several months.

OTIS H. CUTLER, chairman American Brake Shoe & Foundry Co., died at Miami, Fla., March 4. He was born May 15, 1866, and for a number of years was connected with the Baldwin Locomotive Works.

FRANK E. CABLE, Porter-Cable Machine Co., Syracuse, N. Y., died March 7 at Newton Center, Mass., following an illness of ten days of heart trouble. He was 66 years old.

STEEL MAKING COSTS IMMUNE

Federal Trade Commission Cannot Force Producers to Report Costs

WASHINGTON, March 7.—Holding that manufacturing is not commerce and that the Federal Trade Commission was trying to interfere with commerce, Judge Bailey, in the Supreme Court of the District of Columbia, last Saturday signed an order and final decree making permanent the temporary injunction restraining the commission from compelling independent iron, steel and coke producers to make monthly reports to the commission of their costs of production and other intimate details of their business.

This victory in what is known as the Claire Furnace Co. case, involving 22 producers, is of great importance, and the ultimate outcome is being watched with deep interest by business organizations. The principle embraced in the proceeding is of far-reaching character to all manufacturing enterprises of the country, and the case is clearly a test as to whether the commission has the authority to force producers to make reports to it as to facts which are considered by them to be of a purely private nature. That both the steel producers and the commission consider the proceedings to be of vast importance is evident from the fact that it will be contested through the Supreme Court of the United States.

The decision of Judge Bailey was in accordance with his previously expressed opinion that he would strike out the entire amended answer of the Federal Trade Commission as not stating a sufficient defense and in the nature of a demurrer. Because of this he made the injunction permanent, pursuing a policy similar to that he established in the Maynard Coal Co. case. In open court counsel for the commission noted an appeal which was allowed, and the case now is before the Court of Appeals of the United States in Washington.

The case as it now stands on appeal makes a square issue between the bill of complaint and the amended answer of the commission. The date for argument before the Court of Appeals has not been set. The argument will be made on the case as stated by the pleadings.

The case originated in December, 1919, when the commission called upon the iron, steel and coke makers to produce the data required. Claim was made by them that the commission has no jurisdiction and that its attempt to compel the production of the facts wanted is unconstitutional. Judge Bailey first issued a temporary restraining order against the commission. Various arguments subsequently were made before him, with the result that the permanent injunction and decree were issued.

The producers included in the case are the Claire Furnace Co., Ella Furnace Co., Edgewater Steel Co., Bethlehem Steel Co., Midvale Steel & Ordnance Co., Reliance Coal & Coke Co., Westmoreland-Connellsville Coal & Coke Co., Wierton Steel Co., LaBelle Iron Works, Donner Steel Co., Steel & Tube Co. of America, Cambria Steel Co., Republic Iron & Steel Co., McKeesport Tin Plate Co., N. & G. Taylor Co., Inland Steel Co., Trumbull Steel Co., Youngstown Sheet & Tube Co., Brier Hill Steel Co., West Penn Bridge Co., Wheeling Steel & Iron Co., and Sharon Steel Hoop Co.

James J. Davis, Secretary of Labor, in an address at Lima, Ohio, on Feb. 22, advocated the removal of more than 2,000,000 children from industry, as a means of relieving the unemployment situation. Mr. Davis also advocated not only a living wage, but a saving wage for workers. Further restriction of immigration was also declared to be necessary.

BROADER BUYING

Improvement in Demand for Steel Products in the Mahoning Valley

YOUNGSTOWN, March 7.—In a broader way than at any time in many months, business is coming to independent steel mills in the Mahoning Valley, accelerating schedules. Unless something unforeseen should happen, March gross tonnage placed in this territory should register an appreciable advance over the volume of February sales.

The Republic Iron & Steel Co. has definitely decided to blow in an additional blast furnace, after an idleness of many months, increasing the number of its active stacks to two.

Incoming sheet business shows a broader range, and orders for 400 and 500 tons are coming through with considerably more frequency, whereas a month ago business was largely confined to 25 and 50-ton lots. With exception of sheet makers catering particularly to the automobile trade, delivery is possible within a couple of weeks.

Rather than continue to meet prices on plates which it characterizes as "ruinously low," the Brier Hill Steel Co. has marked up its quotation on this product to 1.65c. per lb. This compares with an actual price at which plate tonnage has moved in competitive districts of 1.35c. The Brier Hill company maintains it cannot accept plate business at a price below the slab market. A small volume of plate tonnage is being placed. The company announces suspension of its 132-in. mill is preferable to its continued operation at a loss.

Another Valley independent is quoting 1.40c. on

plates, with operations on merchant material intermittent.

Open-hearth furnace operations have been materially enlarged within the past two weeks due to the sustained demand for semi-finished material from non-integrated sheet and tin plate interests, and to the broader requirements of finishing units of self-contained interests.

At the beginning of the week, 38 of 51 independent open-hearths were scheduled for production in the Mahoning Valley. Buying of billets and wire rods, in addition to sheet bars, by non-integrated interests, has caused steel making to expand at a more rapid rate than rolling mill production. Finishing mill schedules are stronger all along the line, excepting plate units. Sheet mill capacity is engaged to the extent of about 52 per cent.

Open-hearth sheet bar prices continue firm at \$29 to \$30. With scrap quotations advancing, a Valley independent anticipates an increase in sheet bar quotations of from \$1 to \$2, if buying activity is maintained. An advance in sheet bars, it is pointed out, would likely affect the sheet market. Prices of sheets entered the year firm at 3c. and 4c. for black and galvanized respectively, base gages, and these prices have held since. Blue annealed continues to be quoted at 2.25c., but an advance to 2.40c. in its quotations is being considered by a Valley interest.

It is generally held that the time is not yet at hand to warrant higher quotations in sheets. The market, however, is likely to be responsive to broader requirements, as makers are unsatisfied with existing prices. One interest which is operating eight sheet mills states that current business is sufficient to enlarge production, which is held down for the time being by lack of steel.

Volunteer Committee to Relieve Unemployment of Engineers

Volunteer committees of engineers to aid in meeting the unemployment situation are being formed in the principal industrial centers of the country. These committees will co-operate with the Employment Service of the American Engineering Council of the Federated American Engineering Societies, whose headquarters are in the Engineering Societies Building, 29 West Thirty-ninth Street, New York. Unemployment has been so widely prevalent among engineers that a big volunteer committee was formed in New York to aid the overtaxed employment service, which for months has had more than 3000 applications for jobs on file, according to the manager, Walter V. Brown.

Frank A. Casey, Billerica, Mass., is in charge of the volunteer work in Boston. In Cleveland the Cleveland Engineering Society has appointed a special committee on employment with C. R. Sabin as chairman. In Bridgeport, Conn., William E. Hogan is heading the movement, while the work in Fairfield County, Conn., is being directed by Paul D. Wright, 309 Edgewood Avenue, New Haven, Conn., and H. R. Audit, New Haven. In New Jersey the committees are being headed by S. B. Austin, Boonton, N. J., and A. F. Johnson, 363 Kenegan Avenue, West Hoboken, N. J., George Beavers is directing the volunteer work in Milwaukee and C. C. Coonan of the Rochester Engineering Society is in charge in Rochester, N. Y.

More Employment in Cleveland

CLEVELAND, March 6.—Industrial employment in Cleveland showed a fair gain during February and more men are now at work in this city than at any time since last May, according to the monthly survey of the Cleveland Chamber of Commerce Committee on labor relations. The figures are based on reports from 100 plants normally employing 500 or more persons. These reported 73,158 employees on their payrolls Feb. 28, as compared with 69,352 on Jan. 31, an increase of 5.5 per cent. The greatest gain was in the automotive field. Eighteen companies making motor cars and accessories on Feb. 28 were employing 8728

persons, as compared with 7440 on Jan. 31, a gain of 17 per cent. The increase in employment in the metal trades, which includes iron and steel plants, was 9 per cent. There was a 10.8 per cent increase in the employment in plants making metals and metal products other than iron and steel. The low point was reached in July last.

Judge Gary on Business Conditions

Judge E. H. Gary, chairman of the United States Steel Corporation, in an interview with a representative of the New York News Bureau, Tuesday afternoon, said:

"Although there has been a gradual, if limited, improvement in business conditions during the last few months, I have seen no substantial evidence of general rapid recovery to normalcy, so called. Probably it is better so. The natural laws applying to business are grinding slowly but surely, and will compel sooner or later stability, progress and prosperity.

"If the laws of the country shall be sufficiently enforced to permit every individual to utilize his talent and energy without forcible interruption, we shall soon see the prosperous conditions for which we have been anxiously and expectantly looking for many months.

"The sun of prosperity is still shining, though it has been unnecessarily obscured."

Announcements were made this week from the general offices of the Locomobile Co. of America, Bridgeport, Conn., automobile and truck manufacturer, that over 200 additional workmen were added to the payroll on Monday, Feb. 27. Col. Elmer H. Havens, president and receiver of the company, states that a greater demand for the company's product is the main cause, and also states that business is "picking up" nicely.

The plan of the Ohio Industrial Commission to establish medical depots in various districts of the State for the benefit of injured workmen is meeting with strong protest, according to the committee on workingmen's compensation of the Cincinnati Chamber of Commerce.

RAILROADS UNYIELDING

Testimony Opposes Reduction of Rates in Iron and Steel Products

WASHINGTON, March 7.—The rebuttal testimony of railroad witnesses in the general rate investigation case before the Interstate Commerce Commission clearly shows that the railroad executives have not yielded in the slightest in their opposition to rate reductions. They are still seeking certain "adjustments" independent of any formal proceedings. One of these relates to proposed cuts in rates on iron ore. Apparently the railroad executives feel that by attempting to controvert the testimony given by witnesses who vigorously urged general rate cuts in the basic lines, such as iron and steel and coal and coke, they would make their most effective point toward forestalling sweeping cuts. The rebuttal ended last Saturday.

Arguments will start to-morrow and the case will come to a final close on Saturday of the present week. It is believed that the commission will hand down an early decision. This has been urged by both shippers and carriers and the great volume of testimony that has been taken since the case was begun on Jan. 17, has been analyzed as it proceeded by a large corps of experts of the commission.

While railroad representatives have conceded that rates eventually will come down, they have at all times strongly opposed any general reductions. They have taken the position that the rate structure must be gradually straightened out by adjustments and they have laid considerable stress upon those which have already been made. It is evident that they are fearful of a broad sweep of cuts involving a heavy volume of traffic. In the course of the rebuttal, they have maintained that any reduction being made at the present time would not stimulate traffic. A contrary view has been taken by shippers. With this as their basic idea, the railroad witnesses in their rebuttal testimony devoted a large portion of their attack against reductions in coal, coke, and iron and steel rates.

Mr. Cochran's Statement

In this connection, an elaborate statement was made by H. H. Crocker, assistant coal traffic manager of the Baltimore & Ohio, sharply attacking the testimony of shippers asking for rate cuts in coal and coke, and iron and steel. His testimony was taken to be particularly significant in view of the prevailing opinion that while a general rate reduction is not probable, cuts in rates on coal and other raw products at least are likely to be ordered. Manifestly, however, this opinion can be nothing but a surmise.

Shippers contend that the railroads, realizing the prevalence of this opinion, are attempting to prevent such action, thinking that to do so would also make cuts in rates on iron and steel and other lines improbable. The railroad people contend that their financial condition does not warrant cuts in rates on coal or any other commodity involving a great volume of traffic. The shippers plainly recognize the interdependence of the railroads and industries, but representatives of the carriers argue that reduced rates would not increase traffic and would only further deplete their revenues. The shippers, on the other hand, have argued that reduced rates would increase the volume of traffic to such an extent that there would be a greater net return to the carriers.

Opposed to Reductions

The testimony of Mr. Cochran was in opposition to reductions in rates on coal and coke and iron and steel products. Concerning coal, he strongly denied the testimony given by J. D. A. Morrow, vice-president of the National Coal Association, that reduced coal rates would result in decreased operating costs for railroads, or increased traffic. He also denied testimony of witnesses of steel interests that a reduction in coal rates would be followed by any increase in outbound shipments of steel products, but would only tend to reduce the cost of producing iron and steel. He took the situation of the iron and steel producers as typical of the

situation of other producers throughout the United States, using coal for manufacturing purposes and, as he said, the railroad people "carefully digested the testimony of the representatives of the iron and steel interests for the particular purpose of determining whether a reduction in coal rates would stimulate the movement of traffic or merely operate to reduce the cost of manufacturing iron and steel articles. The testimony is convincing that in any event in the absence of a concomitant reduction in the rates on outbound iron and steel products, a reduction in the coal rates would not be followed by any increase in the outbound tonnage, but would merely operate to reduce the cost of production."

Comment by Shippers

Steel shippers have commented on the testimony of Mr. Cochran as lacking in comprehension of economic facts. In this connection, they pointed to one of his general contentions that even if railroad rates on steel products were reduced, the benefit would be passed along to the consumer. At the outset, steel shippers say, the basic idea of rate making relates to the reasonableness or unreasonableness of the rates and other matters, such as benefits of the ultimate consumer, are extraneous. Moreover, Mr. Cochran, while saying that the ultimate consumer would not be given the advantage of cut rates in steel products, indicated his agreement with steel makers that the prices of their products in many cases are below cost. By reason of this fact, steel interests have pointed out that they can hardly be expected to "pass along the benefits" of rate reductions while losing money. In any event, it is pointed out, prices for finished steel now are lower than at any time since December, 1915, and those for pig iron lower than at any time since September, 1916, despite the much higher costs due to excessive railroad rates.

The trend of prices as a result of rate reductions, manufacturers have stated, would depend upon market conditions but they have stated positively that the steel industry cannot permanently produce at a loss, and unless it does get into heavier production the effect on transportation as a result of reduced volume of traffic will injure the railroad along with the steel industry itself.

Fewer Metal Workers and Lower Wages

Iron and steel plants, according to figures of the Bureau of Labor Statistics, show for January a loss of 7623 employees in 105 establishments. This loss of 6.9 per cent was accompanied by a loss of 16.9 per cent in the half-month payroll, with a corresponding reduction in the average pay envelope from \$44.09 to \$39.35, or 10.7 per cent.

Similar decreases, both in number of employees and in half-month payroll, together with sharp drops in average pay envelopes, were recorded by both the automobile and the car building and repairing industries. Present wages in the automobile industry, on this showing, are slightly below those in the iron and steel mills. Wages in car building and repairing, however, are considerably higher than in either of the other two groups, being \$51.76 in January, which is 31½ per cent above the average pay envelope in the iron and steel industry. This reflects in large measure the continuance of wartime wages in the railroad car shops, against which the railroad managements are now moving.

Period	Number of Establishments	Number of Men	Half-Month Payroll	Average Pay Envelope
Iron and Steel				
January, 1921 ..	106	131,358	\$9,042,235	\$68.94
January, 1922 ..	105	102,918	4,049,524	39.35
December, 1921 ..	105	110,541	4,873,934	44.09
Automobiles*				
January, 1921 ..	47	36,588	2,257,970	61.72
January, 1922 ..	47	86,282	3,289,717	38.13
December, 1921 ..	47	91,682	6,120,875	65.85
Car Building and Repairing				
January, 1921 ..	53	63,559	4,419,424	69.54
January, 1922 ..	53	53,114	2,749,060	51.76
December, 1921 ..	53	56,103	3,854,370	68.79

*Payroll figures are reported as "weekly"; they have been made "semi-monthly" by multiplying by 2 1/6.

Further Gains in Iron and Steel Exports

January Shows Advance Over December—Best Month Since April—Gains in Wire, Wire Rods, Galvanized Sheets, Tin Plate and Rails

WASHINGTON, March 7.—Increases were made in iron and steel and machinery exports, and iron and steel imports, during January, as compared with those of December. Whatever this greater movement of commerce in these basic products may mean in the way of a gradual and permanent improvement in conditions of world economics, they have at least afforded encouragement to students of industrial conditions.

The new classification of iron and steel and machinery exports of the Bureau of Foreign and Domestic Commerce, effective in January, caused a revision of our export table.* The outstanding difference between the new and old classifications is that the present one subdivides products and, with some exceptions, is more specific. The effect on the tonnage, however, is relatively unimportant, because only in a few instances are new items included. Some of these, such as castings and forgings, have been reported previ-

ously by value, but now appear according to both value and tonnage. In view of the fact that these have not been reported by tonnage previous to January, no figures are recorded for the seven-month period, but are included for the single month.

The machinery group has been considerably amplified and subdivided and this group now takes in agri-

Exports, January, 1920, to January, 1922, Inclusive

	Gross Tons		
	All Iron and Steel	Pig Iron	Semi-finished Material
Calendar year 1919..	4,239,837	309,682	258,907
January, 1920	333,601	18,468	19,937
February	308,185	15,739	22,693
March	417,216	22,740	30,444
April	395,120	14,608	19,032
May	420,359	13,032	16,370
June	402,707	17,075	29,811
Fiscal year 1920.....	4,212,732	248,126	288,766
July	458,866	29,647	17,243
August	431,484	22,645	20,920
September	409,200	22,724	18,113
October	452,015	17,296	11,853
November	434,297	13,929	7,042
December	498,765	10,055	3,415
Calendar year 1920..	4,961,851	217,958	216,873
January, 1921	547,394	3,710	315
February	393,328	1,307	92
March	230,635	2,320	1,023
April	162,592	1,234	678
May	142,551	2,541	749
June	119,081	1,689	1,106
Fiscal year 1921.....	4,168,619	129,541	82,549
July	86,523	2,744	363
August	75,827	2,424	2,447
September	95,169	3,078	1,318
October	106,582	2,830	153
November	122,290	1,299	1,869
December	134,415	2,550	250
Calendar year 1921..	2,213,042	28,305	10,363
January, 1922	160,920	1,043	4,683
Seven months	775,706	15,543	10,891

*Editor's Note: Most of the items in the new classification are identical, or practically so, with corresponding items in the old, permitting direct comparison. Important divergences follow: Sheet bars and skelp have been added to the old group of ingots, billets and blooms. Iron and steel bars are now grouped, where previously they were reported separately; alloy steel bars are now separately reported. Iron plates have been added to the old item of steel plates. Black iron sheets are reported separately, having previously been included under "all other sheets and plates." Strip steel has been added to the old item of hoops and bands. Structural steel, now segregated between plain and fabricated material, includes two old items—"structural steel" and "ship plates, punched and shaped"; the latter is included under fabricated material. Rail fastenings, switches, frogs, etc., take the place of railroad spikes, and cover a much larger group of materials. The heading of the new item "boiler tubes, welded pipes and fittings" is more inclusive than the old "welded pipe and fittings." The wire products, except for wire nails, have been entirely recast. Cut nails are now reported under the general head of "nails, other than wire, including tacks." Radiators and cast house boilers are no longer reported separately. Several new items appear, as shown in the table.

Imports of Iron and Steel—Gross Tons

	January		Seven Months End'g January	
	1921	1922	1921	1922
Ferromanganese	1,107	1,300	39,098	5,171
Ferrosilicon	213	1,593	5,951	7,828
Pig iron	2,435	6,346	47,584	20,419
Scrap	12,156	2,412	75,082	24,150
Bar iron	113	282	3,196	1,463
Steel bars*	328	268	3,618	2,299
Structural steel	25	174	1,060	593
Billets, without alloys .....	...	137	746	5,565
All other billets	440	118	2,608	430
Steel rails	147	365	28,429	13,112
Sheets and plates	52	62	1,021	225
Tin and terne plates	65	171	259	296
Wire rods	69	178	4,252	665
Total	17,150	13,406	222,904	82,216
Manganese ore and oxide ..	49,699	9,500	440,094	118,479

*Not previously recorded separately.

cultural implements, electrical machinery and vehicles.

While the recovery in iron and steel exports has been comparatively small, it has been continuous since last September. The January movement was the largest since April of last year, when exports totaled 162,592 tons.

Exports in January of this year totaled 160,920 gross tons, valued at \$15,149,174, as against 134,415 tons, valued at \$29,502,448, for December. For the seven-month period ending with January, 1922, the total was 775,706 tons, valued at \$97,898,465. This compares with 3,199,343 tons, valued at \$738,112,394, for the corresponding period one year ago. Exports

Exports by Countries for January, and for the Seven-Month Period Ending January, 1922, of Leading Steel Products

	January, 1922	Per Cent of Total	Seven Months Ending January, 1922
Galvanized Sheets: Gross Tons			Gross Tons
Japan	7,923	49.3	8,927
Philippine Islands ..	1,399	8.7	3,074
British India	1,301	8.1	2,161
Black Sheets:			
Japan	22,530	89.5	128,896
Canada	1,461	5.8	13,692
Tin Plate:			
Japan	6,189	51.3	21,726
Canada	1,862	15.4	13,271
Hongkong	1,512	12.5	2,961
Rails:			
Japan	21,140	71.2	42,302
Canada	2,453	8.3	19,501
Chile	1,533	5.2	2,861
Honduras	1,499	5.1	7,730
Galvanized Wire:			
Japan	5,477	...	10,278
Canada	793	...	5,615
Wire Nails:			
Japan	3,663	55.7	8,133
China	1,089	16.6	1,716
Sum of Six Items Above:			
Japan	66,922	67.2	220,262

reported for January of last year totaled 547,394 tons, valued at \$137,803,395. These figures vividly reflect the sharp slump in both value and volume of exports during January, and the seven-month period ending with January, 1922, when compared with the same periods of one year ago.

Imports in January of the present year totaled 13,406 tons, valued at \$2,164,082, and for the seven-

month period amounted to 82,216 tons, valued at \$14,889,898. These figures include steel bars, not previously separately reported in our tables. December imports were only 9309 tons, valued at \$1,964,159. For January, 1921, imports totaled 16,822 tons, valued at \$2,549,811, and for the seven months ending with January of last year the imports aggregated 219,286 tons, valued at \$30,787,260.

Imports of manganese ore in January of the present year totaled 9500 tons, valued at \$47,614, and for the seven-month period ending with January, 1922, they amounted to 118,479 tons, valued at \$672,018. Manganese ore imports in December totaled 14,900 tons, valued at \$75,770. For January of last year they totaled 49,699 tons, valued at \$1,036,096, and for the seven-month period ending with that month, they totaled 440,094 tons, valued at \$8,494,380.

Exclusive of agricultural implements and vehicles, machinery exports for January, 1922, aggregated \$17,243,154, and for the seven-month period ending with that month their total value was \$136,497,306. Similar exports in December were valued at \$15,068,-

seven-month period that country took 42,302 tons of rails out of the aggregate exports of 114,628 tons.

Rails constituted the largest single item of export in January. Of the total exported, 26,306 tons were rails weighing 50 lb. and over per yard, while 3364 tons were light rails weighing under 50 lb. per yard.

Of the 25,170 tons of black steel sheets exported in January, Japan took 22,530 tons, or 89.5 per cent, and for the seven-month period that country took 128,896 tons out of the total exports of 154,960 tons, or 83.2 per cent. This movement to Japan indicates that American manufacturers have built up a substantial market there, but also is attributed partly to the fact that the Japanese industry is greatly depressed, owing to its inability to produce as economically as industries of the United States and other countries where operations have long been organized on an efficient basis.

The largest single item of imports was pig iron, the inbound movement of this blast furnace product being 6346 tons, while scrap ranked second, with 2412 tons; and ferrosilicon third, with 1593 tons. Imports of rolled steel were light.

The New Patent Law

President Harding has presented to Edwin J. Prindle, chairman of the Patent Committees of the Mechanical Engineers, the pen with which the Patent Office relief bill was signed. Mr. Prindle, a New York lawyer and engineer, led the fight for the engineers in their nation-wide campaign to wipe out archaic conditions in the Patent Office.

Manufacturers, inventors, scientists, lawyers and other classes joined in the movement, the success of which was described in an engineering announcement as a "great stimulus to the production of American inventions, which is the chief object of our patent system."

The pen was forwarded to Mr. Prindle by George B. Christian, Jr., secretary to the President, and at the same time came a letter from Thomas E. Robertson, Commissioner of Patents, in which he pointed out that the Patent Office victory, won after four years of effort, signalized an outstanding achievement in the public interest. Engineers said that the passage of the patent measure relieved a situation which menaced American industry and invention.

Mr. Prindle explained that the new law added \$451,000 to the payroll of the Patent Office, increasing the salaries of the examiners approximately 45 per cent and the number of examiners 10 per cent. "The bill," he added, "also contains an amendment to the patent law which will make a money recovery possible in all patent infringement cases where the patent has been held to be valid and there has been any substantial use of the invention. Heretofore the rules governing accountings in patent infringement suits have been so technical and illiberal that a money recovery has been impossible in most cases."

"Recently a few decisions have been rendered in which a more equitable principle has been applied to a limited class of infringement cases. The amendment makes the said principle statutory and extends its application to all classes of infringement cases."

Officers of the steel works section, Engineers Society of Western Pennsylvania, elected at the annual meeting at the William Penn Hotel, Pittsburgh, Feb. 28, are: Strickland Kneass, Jr., Youngstown Sheet & Tube Co., chairman; G. M. Goodspeed, National Tube Co., McKeesport, Pa., vice-chairman; T. J. McLaughlin, Carnegie Steel Co., Duquesne, Pa., Barton R. Shover, consulting engineer, Pittsburgh, Charles McKnight, Jr., Carbon Steel Co., Pittsburgh, G. D. Bradshaw, Andrews-Bradshaw Co., Pittsburgh, and A. F. Backlin, American Steel & Wire Co., Pittsburgh, directors.

C. M. Johnson, director research department and chief chemist, Park Works, Crucible Steel Co. of America, was the speaker at the annual meeting of the Steel Works section, Engineers' Society of Western Pennsylvania, at the William Penn Hotel, Pittsburgh, Tuesday evening, Feb. 28.

Exports of Iron and Steel—Gross Tons

	January		Seven Months Ending January	
	1921	1922	1921	1922
Pig iron	3,710	1,043	116,590	15,543
Ferromanganese	118	121	3,055	412
Ferrosilicon	98	53	521	267
Scrap	5,849	4,585	165,653	19,503
Ingot, blooms, billets, sheet bars and skelp	315	4,683	78,901	10,891
Iron and steel bars.....	67,570	6,375	389,981	7,206
Alloy steel bars.....		684		
Wire rods	5,556	6,438	54,892	56,428
Plates, iron and steel.....	110,485	2,801	595,300	63,845
Galvanized sheets	11,408	16,058	67,110	34,165
Black steel sheets.....	18,294	25,170	110,495	154,960
Black iron sheets.....	2,592	1,985	21,035	
Hoops, bands and strip steel	3,365	2,463	29,712	10,612
Tin plate, terne plate, etc.	34,545	12,061	138,476	45,396
Structural shapes, plain material	74,737	4,196	367,451	67,728
Structural materials, fabricated	4,167	3,859	27,149	5,809
Steel rails	59,739	29,670	372,433	114,628
Rail fastenings, switches, frogs, etc.	2,067	2,577	10,143	5,048
Boiler tubes, welded pipe and fittings.....	72,999	12,393	238,570	81,012
Cast iron pipe and fittings	10,100	1,235	51,472	14,579
Plain wire	25,980	8,237	139,948	23,744
Barbed wire and woven wire fencing	9,756	2,348	77,754	(b) 13,269
Wire cloth and screening		98		
Wire rope and cable.....		533		
Wire nails	8,532	6,575	67,733	18,383
Nails, other than wire, including tacks	1,588	600	11,331	3,042
Horseshoes	83	62	1,237	325
Bolts, nuts, rivets and washers, except track	6,599	1,015	25,889	6,925
Car wheels and axles.....		2,050		
Iron castings.....		449		
Steel castings.....		363		
Forgings.....		120		
Machine screws.....		15		
Total	547,394	160,920	3,199,343	775,706

*Not reported separately prior to January, 1922.

†Previously reported by value only.

(b) Includes barbed wire only.

096. For January, 1921, their value was \$56,705,507, and for the seven-month period of one year ago the total was \$300,277,127.

Exports of lathes in January were valued at \$64,351, and for the seven months, \$707,036; sharpening and grinding machines at \$43,296 and \$490,508, respectively, and all other metal working machinery at \$445,555, and \$4,774,476, respectively.

It is interesting to observe that Japan was the greatest single source of export of American iron and steel products in January. While this Oriental country has long been a big purchaser of products in this country, Canada is, of course, the greatest permanent consumer outside the domestic market itself, but was second to Japan in January. Japan led in the purchase of such products as steel rails, black and galvanized sheets, tin plate, galvanized wire, and wire nails. Of the 29,670 tons of steel rails exported in January, 21,140 tons went to Japan, and for the

Shipping Iron and Steel Products by River

A. B. Shephard Tells of the Experiences of One Company—Good Time Made, but Handling Charges Were Excessive

WASHINGTON, March 7.—Pointing out that ever since the cessation of the war, the railroad transportation situation has been in such condition, particularly with the high rates prevailing, as to seriously restrict the markets of the iron and steel industries in the Pittsburgh district, A. B. Shephard, of the Jones & Laughlin Steel Co., Pittsburgh, addressed the National Rivers and Harbors Congress at its convention here last Wednesday, and told of the relief that has been sought by turning to transportation on the Ohio and Mississippi rivers. Mr. Shephard explained the work which the company undertook during the past summer for the delivery of its finished products by river transportation to consumers in the South, the West, and Southwest. He said that no attempt had been made to set up a so-called barge line, the company using the barge equipment owned by its subsidiary, the Vesta Coal Co., which carried the products while power for towing was arranged with local steamboat owners. Mr. Shephard said that on Oct. 27, 1921, the first tow departed from Pittsburgh and consisted of half dozen steel coal barges temporarily converted into merchandise carriers. He said that trans-shipping and delivery at various points down the rivers into customers' warehouses were provided. The total shipment delivered on the first tow was about 4000 tons of various products, mostly structural shapes, steel pipe, wire nails and fence material. A second tow was immediately arranged for, Mr. Shephard said, and departed a few weeks later for Louisville, Ky., Evansville, Ind., St. Louis, and Memphis, Tenn., carrying approximately 8000 tons of steel products.

Attracted Much Attention

"The departure, movement and arrival at destination of these two tows," Mr. Shephard said, "attracted widespread attention, not only in the Ohio and Mississippi Valleys, but throughout the country, being hailed, as indeed it was in degree, as marking the return of activities on our inland waterways. Several of the other large steel companies in the Pittsburgh district followed closely each step in the progress of this undertaking, and have since themselves sent considerable quantities of their products to downriver points in the same manner."

Mr. Shephard pointed out that the system operates to give the Jones & Laughlin Steel Co. a wider market for its products than is obtainable under the present high schedule of freight rates and operates similarly for their customers who have received products in this manner.

"It might be stated," continued Mr. Shephard, "that the average saving to the customer who has purchased Jones & Laughlin Steel Co. products delivered by barge has been between \$2 and \$2.50 per ton. As these products were sold in considerable quantities only, it will be noted that the saving on a 1000-ton barge-load, for example, amounts to \$2,000 to \$2,500, which is highly appreciated in these times of close competition and strict economies.

On a Permanent Basis

"It is the intention of the company to establish this service on an efficient and permanent basis, and to continue it as a factor in the general service offered to its customers. Efforts will be made to arrange for delivery of products to points at still greater distances from Pittsburgh, and also for export through New Orleans. It is believed that this business will amount to probably 50,000 tons or more during the present year, and within a short time, if the proper facilities are provided, it will be moving at the rate of 100,000 tons or more per year, and it is not unreasonable to expect that the last

named amount will, in time, more nearly represent a monthly shipment instead of a yearly shipment.

"In preparation for the development of this business, careful survey of the whole situation is being made, together with studies of the most adaptable equipment and the most economical loading and unloading devices.

"Difficulties were encountered in these first shipments both in the movement on the rivers and at the unloading points. Delays were experienced by lack of sufficient water in the river on several occasions. Notwithstanding these delays, and others occasioned by fog and being compelled to tie up occasionally, good time was made. The tow which left the Ohio River (Aliquippa) Works on Oct. 27 docked at St. Louis Nov. 9, practically 14 days for the movement as against 10 days rail delivery.

Can Shorten Time

"With the river improvement completed, this time can be much shortened, possibly to equal the present rail time.

"The terminal facilities for unloading at the delivery points were in general unsatisfactory, and the cost of handling the materials excessive. In some cases the terminal cost exceeded the total transportation cost. This is a condition which will have to be remedied, as it is certain that the future of the river transportation depends largely upon the cheapness and facility with which materials may be loaded and unloaded, and trans-shipped to destination. This fact will have to be fully recognized by the communities on the rivers which now have, along their entire river frontage, no means for unloading barges except possibly the costly and exasperatingly slow old wharf boat methods, and by others which have provided very modern terminals, but with facilities only for handling package goods, having made no provision for handling the weights and lengths encountered in the shipping of steel products.

Two Things Necessary

"It seems obvious, therefore, that before this river transport service can be permanently established it must be recognized by those interested that two things must be done: One is that a reliable stage of water must be made available by the completion of the river improvements, and the other is that provision must be made at the various delivery points for prompt and economical unloading and trans-shipment.

"With these facilities provided, I feel safe in predicting that the traffic on the Ohio and Mississippi rivers will be revived and developed and continue to expand in volume until even the dream of the most enthusiastic advocate of water transportation will be realized, and that, at the same time, the railroad systems reaching the same territories will have all the traffic that they can carry, a condition which when brought about will be an everlasting benefit to the communities located in these valleys and to the country."

Demand of the Congress

At its closing session on Thursday, the National Rivers and Harbors Congress adopted a resolution "demanding" that Congress approve at this session not less than the amount of money recommended by the Chief of Army Engineers as necessary for improving the national rivers and harbors.

Dr. Julius Klein, in an address at the banquet of the congress, said that "the natural advantages enjoyed by our overseas competitors because of their location close to the sea are difficult enough to overcome, but when this handicap is supplemented by staggering transportation charges covering long hauls to water

fronts, the unwilling exporter is up against it." He said that the seriousness of the situation from the export standpoint "will perhaps be realized if we bear in mind the fact that 40 per cent of the manufactured articles exported from this country originated west of

Pittsburgh, east of the Rockies, and north of the Arkansas-Tennessee line."

Vice-President Coolidge said that the "country looks for its present and future development to the use of its waterways, the natural avenues to trade."

President's Plan for American Merchant Marine

He Is Intensely in Earnest and His Ideas Are Finding
Much Support and Some Opposition

WASHINGTON, March 7.—The upbuilding of an adequate, privately owned American merchant marine is now being attempted by the Harding Administration. Easily one of the most fascinating and vital objects of legislation that ever comes before Congress, the course of the program laid out by the President for a merchant marine in his address before Congress last Tuesday is being watched with intense interest. The customarily divergent views on the subject exist to-day as hitherto. The fight ahead plainly is going to be a hard one and meanwhile its outcome is in doubt. The President in his clear and definite message mapped out a program that many, Republicans and Democrats alike, say not only is constructive but one that must be adopted if the long-hoped-for merchant marine is to be created so as to serve the industrial, agricultural and other interests of the country. A bill to this end has been introduced and efforts are being made to pass it at the present session of Congress. But there can be no denying the fact that it faces strong opposition. Aside from the foreign influences, which it is freely charged always attempt to obstruct legislation looking to the upbuilding of an American merchant marine, the Harding program is being opposed by the powerful agricultural bloc in Congress. This has been recognized with considerable discouragement and is held to be particularly unfortunate, inasmuch as it is evident that an American merchant marine would be of as great benefit to the agricultural interests of the United States as it would be to the industrial and other interests. It is firmly contended that unless there is an adequate American merchant marine, talk of building up a great export trade for any of these interests is entirely futile. And it is further argued that unless a privately owned fleet is created now, attempts to do it in the future will be well nigh hopeless.

Much of the opposition is based on the idea of a subsidy, though some of it is believed to be merely using this plea as an evasion. The President never appeared to better advantage than he did in connection with presenting his merchant marine program, and he had no hesitancy whatever in advocating the subsidy plan and to say so in the most direct terms. His doing so has elicited much admiration and the intensity he showed in urging the legislation was the object of much favorable comment. Always manifesting a particular interest in the matter of building up an American merchant marine, the President showed that he had given it careful thought and that he was aware of the influences at work against a merchant marine and the obstacles that must be faced. His program omitted some recommendations which many think ought to have been included, among them repeal of the LaFollette seaman's act, but at the same time, it is broad and comprehensive and carries plans which he feels would accomplish the purpose desired. There is evident also a broader view throughout the country as to merchant marine legislation, and this takes into account the necessity of creating a merchant marine by any method that is practical rather than the insistence upon particular methods. The President, in fact, challenged those opposing his program to offer a satisfactory alternative to the subsidy plan, which, it is estimated, would cost about \$32,000,000 annually, but would mean a vastly greater amount in savings to American shippers. The program really includes both a direct subsidy and indirect aid, and the incen-

tives it holds out may be seen in the following proposals it includes:

Creation of a merchant marine fund by diverting 10 per cent of all customs receipts, netting about \$302,000,000 a year and avoiding alleged complications with regard to treaties if discriminating duties were adopted; all tonnage taxes collected on both foreign and American ships to be added to the merchant marine fund; doubling tonnage taxes, to yield approximately \$4,000,000 annually; one-half of all profits to private owners in excess of 10 per cent to be added to merchant marine fund; establishing of a construction loan fund of \$125,000,000, drawing 2 per cent, and to be used for shipbuilding; deductions from income taxes of shippers equal to 5 per cent of freight paid on goods imported in American bottoms; greater depreciation allowances in income tax returns on ships; waiving of all income taxes when their amount is applied to half the cost of new ship construction; 50 per cent of all immigrants to be carried in American ships; building up of merchant marine reserve to the maximum of 5000 officers and 30,000 men employed on merchantmen, receiving a maximum of \$3,000,000 in pay each year from the Navy; all Government freight and passenger traffic to be carried on American ships whenever possible; army transport service to be turned over to Shipping Board; coastwise shipping laws to be extended to the Philippine Islands so as to confine all trade between the islands and the United States to American ships; preferential rail rates on through shipments on American vessels and co-ordination of rail and water transportation and development of railroad-owned vessels.

The program was indorsed by the National Merchant Marine Association at its convention here last week. It was also the object of some attacks at the convention, but they were few and relatively unimportant. The convention showed itself to be strongly desirous of going on record in favor of the immediate building up of a privately owned American merchant marine, and several speakers made vigorous attacks on foreign influences which are seeking to prevent its being established. Among them were Chairman Lasker and Commissioners Chamberlain and Benson of the Shipping Board, who urged a merchant marine both as a commercial necessity and a naval auxiliary.

Sixty students in the department of mechanical engineering, University of Wisconsin, Madison, have enrolled in a new course in metallography, or the study of alloys and alloy steels, which is being conducted during the second semester under the direction of Prof. E. D. Fahlberg, of the chemical engineering department. It is stated that the course has been instituted in response to an ever-increasing demand from factories and shops for men who know the heat-treating of metals and alloys and understand the properties of alloys.

To meet the demand for a sliding frame saw suitable for somewhat lighter work than its No. 75 is designed for, the United Engineering & Foundry Co., Pittsburgh, has developed a new size, designated as No. 40, weighing about two-thirds as much as the No. 75. The first saw of the smaller size was built for the International Nickel Co. and equipped with a 36-in. diameter blade, though a 42-in. blade may also be used. It may be assembled with the blade on either the right or left side.

IRON AND INDUSTRIAL STOCKS

Ruling Prices the Past Week Reflected Conflicting Trade Conditions

Ruling prices on iron and industrial shares the past week reflected conflicting trade conditions. For instance, steel stocks held well because of greater plant activity. On the other hand, the passing of the Sloss-Sheffield preferred dividend has its influence on pig iron producers' preferred share valuations notwithstanding greater buying of iron by melters. High prices for raw cotton and grains have been supplemented by lower, thereby lessening the purchasing power of farmers. Farm and textile machinery makers are less secure if quotations on manufacturers' securities can be taken as an index. Retail trade is slowing up, making for conservatism among banking houses, and firmer money rates than accumulations in savings banks warrant.

The range of prices on active iron and industrial stocks from Monday of last week to Monday of this week was as follows:

Allis-Chal., com.. 45 - 47	Lackawanna St.. 44 - 47
Allis-Chal., pf... 91½ - 92½	Midvale Steel ... 29½ - 30½
Am. Can. com... 39½ - 42½	Nat.-Acme ... 10½ - 12½
Am. Can. pf... 101 - 102	Nat. E. & S., com. 32½ - 34½
Am. C. & F., com. 149 - 151	N. Y. Air Brake. 59½ - 67½
Am. C. & F., pf... -119½	Nova Scotia St.. 20½ - 24
Am. Loco., com.. 107 - 111½	Pressed Steel... 65½ - 66
Am. Loco., pf... -115½	Ry. St. Sp., com. 95½ - 97½
Am. Rad., com.. 86½ - 89	Ry. St. Sp., pf... 112½ - 115
Am. St. Fd., com. 31 - 34	Replogle Steel... 29½ - 31½
Am. St. Fd., pf.. 93½ - 96	Republic, com.. 46½ - 49½
Bald. Loco., com. 104½ - 109½	Republic, pf... 76½ - 78½
Bald. Loco., pf... -108	Sloss, com. 35½ - 39½
Beth. Steel, com. 57½ - 58½	Sloss, pf. 65 - 71½
Beth. St., Cl. B. 61½ - 64½	Superior Steel .. 29½ - 29¾
Beth. St., 8% pf. 106½ - 108	Un. Alloy Steel.. 27 - 28½
Chic. Pneu. Tool. 63 - 67½	U. S. Pipe, com.. 25½ - 29½
Crucible St., com. 52½ - 58½	U. S. Pipe, pf... 61 - 63½
Crucible St., pf.. 81½ - 82½	U. S. Steel, com. 92½ - 95½
Gen. Electric ... 151½ - 154	U. S. Steel, pf... 115½ - 116½
Gt. No. Ore cert. 34½ - 35½	Vanadium Steel.. 35½ - 37½
Gulf States Steel 66½ - 76½	Va. I. C. & Coke .. - 48
Int. Har., com... 90 - 91½	Westinghouse El. 55 - 55½
Int. Har., pf... 106½ - 107½	

American Locomotive Co. Report

The American Locomotive Corp., New York, reports that its gross earnings in 1921 were \$35,711,507.47, and after deducting from this \$30,192,721.90 for the cost of manufacturing, maintenance, administrative expenses, interest on bonds of constituent companies and an allowance for depreciation of \$1,409,838.32 on plant property, there remained a gross profit for the year of \$5,518,785.57, from which there has been deducted an allowance of \$435,000 for estimated United States and Canadian income taxes, the remaining balance of \$5,083,785.57 being the net profit available for dividends, which is equal to \$13.34 per share on the common stock after providing for the regular \$7 dividend on the preferred shares. As 7 per cent had been paid on the preferred stock and 6 per cent on the common stock, a total of \$3,250,000, there remained of the net profits \$1,833,785.57, from which \$1,000,000 was reserved for additions and betterments to plants and \$833,785.57 was credited to surplus. The gross earnings for the year in comparison with those of 1920 show a reduction of about 46 per cent.

It is stated in the report that the volume of domestic business was very materially reduced in 1921 owing to the severe state of business depression. A large volume of foreign business could have been obtained, it is stated, if the company had been willing to accept long-term credit risks.

No construction work was done during the year on the company's proposed new plant in the St. Louis district, and it is the present intention of the company to withhold active development of that property until the general business requirements of the company warrant going ahead.

J. G. Brill Co. in Canada

The annual report of the J. G. Brill Co., which has just been issued to stockholders, indicates that this company has now become well entrenched in its Canadian position. It was only last September that the company took over the Preston Car Works, Preston, Ont., and H. D. Scully, general manager of the Canadian Brill Co., says that, in the intervening five months, the parent company has expended \$500,000 in extending and improving the plant at Preston. Where between 50 and 60 hands were employed last summer the company is now employing 250, with a payroll amounting to \$5,000 per week. The company which is producing one car per day has recently delivered cars to Toronto, Ont., Winnipeg, Man., Victoria, B. C., Sault Ste. Marie, Ont., and to the Hydro-Electric Commission for Windsor and Guelph, Ont. Conductors' cabooses have also been delivered to the Temiskaming & Northern Ontario Railway Commis-

sion. In an interview, Samuel M. Curwen, president of the J. G. Brill Co., of Philadelphia, also president of the Canadian subsidiary, expressed himself as highly pleased with their venture in Canada.

A suit has been filed in the Common Pleas Court of Cincinnati by the Cosmopolitan Bank & Trust Co. seeking to foreclose a mortgage for \$40,000 on the plant of the Bickart Machine & Mfg. Co., The bank seeks a judgment for the entire amount with interest at 8 per cent since June 21, 1915, and also seeks an order for the sale of the property to meet the claim.

Pittsburgh Rolls Corporation Report

The Pittsburgh Rolls Corporation reports for 1921 net profits of \$62,726, equivalent, after preferred dividends, to \$2.45 a share earned on the common stock, compared with net profits of \$108,573 or \$5.37 a share on the common after preferred dividends in the previous year. The income account compares as follows:

	1921	1920
Gross profit from operations.....	\$250,119	\$436,052
Reserve for depreciation.....	91,602	97,468
Interest on funded debt.....	32,486	35,285
Loss on bonds sold and store.....		16,760
Federal tax	14,997	58,654
Interest, cash discounts and other income	20,027	
Net profit for year.....	140,061	227,886
Sinking fund provision.....	77,336	119,313
Balance for dividends.....	62,726	108,573
Dividends on preferred.....	28,000	28,000
Balance for common stock.....	34,726	80,573

Earnings of the company were especially poor during the last six months of the year, according to D. L. Eynon, president of the company. From present indications, earnings will continue to be small during the early months of 1922, he said. Last year, \$112,000 of first mortgage bonds were retired without impairing liquid assets.

Canadian Foundries & Forgings

At the annual meeting of the shareholders of the Canada Foundries & Forgings, held in Brockville, Ont., the report presented from the auditors showed an operating loss of \$3,704, after providing for depreciation. The total loss for the year was \$58,211, which takes in interest on bonds, bank interest on loan administration expenses and allows \$12,000 as interest for dividends on investments. This compares with net profits in 1920 of \$39,979 plus \$77,496 in the form of income from investments. Liabilities have been reduced by half a million dollars and reserve of \$200,000 was taken from the surplus to provide against inventory shrinkage, leaving the balance carried forward to profit and loss of some \$930,000, compared with \$1,204,273 a year ago. At the meeting Hon. W. J. Shaughnessy of Montreal retired as a director, and was replaced by Harry B. Housser of Toronto. The officers elected were as follows: President, W. W. Weir of Montreal; vice-president, Hon. George P. Graham; secretary-treasurer, J. H. A. Briggs; general manager, James Arnold; directors, J. H. A. Briggs, C. N. Monsarrat, C. W. Maclean, W. D. Robb, W. W. Weir, James Arnold, E. F. Conway, Hon. George P. Graham, W. T. Sampson, H. B. Housser.

Sloss-Sheffield Dividend Deferred

The Sloss-Sheffield Steel & Iron Co. directors at their meeting last week decided to defer action on the regular quarterly dividend of 1½ per cent on the preferred stock. After the meeting the following statement was issued: "The board of directors, in view of the existing situation in the pig iron market, decided it was in the interest of the company to conserve its cash resources, and accordingly decided not to take action on the preferred dividend at this time."

Report of Interstate Company

The annual report of the Interstate Iron & Steel Co., Chicago, for the year ended Dec. 31, 1921, shows the effects of the period of business depression through which the industry has been passing. Net earnings were \$479,127, as compared with \$1,515,914 for 1920. After deductions for depreciation, reserve for taxes, interest, inventory adjustment and loss on Liberty bonds sold, the net loss for 1921 was \$344,723, as compared with net profits of \$842,953 for the previous year. A payment of \$144,214 in preferred dividends resulted in a total reduction in surplus of \$488,937.

In his annual statement to stockholders S. J. Llewellyn, president, said in part: "The last year has probably been the most critical and difficult year that the iron and steel industry has ever experienced. Deflation of values began in January and ended only with December. The results show that our tonnage for 1921 was about 45 per cent of that for 1920 and the money value in goods shipped to customers about one-third of that shipped in 1920. We reduced inven-

total values from the beginning to the end of the year about \$284,000. We believe that our inventory values, which are priced at cost or market, whichever is lower at Jan. 1, 1922, will be a good basis from which to operate during the coming year."

Empire Steel & Iron Co. Loss

The Empire Steel & Iron Co. report a net loss for 1921, after charges and federal taxes, depreciation, depletion and inventory losses of \$966,071, contrasted with a net profit of \$448,061 for the previous year. Operating profit in 1921 amounted to \$91,489, total income to \$146,469, interest, expenses and cost of inactive plants to \$450,132, deficit to \$302,653, inventory adjustment to \$280,075, total deficit to \$582,728, depreciation and depletion to \$412,343, making the final deficit \$996,071.

The balance sheet as of Dec. 31 last shows surplus of \$1,802,104, against \$2,804,033 in 1920.

Electric Alloy Steel Co. Report

The Electric Alloy Steel Co., Youngstown, Ohio, booked as much business the first two months of this year as it did all of last year, President Louis J. Campbell informed stockholders March 2 at the yearly meeting.

In 1921 the company sustained an operating loss of \$156,000, and its total deficit, after all charges, including a liberal write-off for depreciation, was \$268,000. It operates a plant at Charleroi, Pa., producing commercial alloy steel bars of crucible and electric furnace qualities, special analysis carbon and high speed tool steels.

The company is constantly establishing new trade connections and has won business recently in sharp competition with other interests. The officers were re-elected.

Industrial Finance

At the recent annual meeting of the Winchester Repeating Arms Co., New Haven, Conn., sales for the past year were given as \$13,243,000, against \$18,042,000 for the year 1920. Losses for the year amounted to over \$1,000,000.

The annual report of the Sullivan Machinery Co., Chicago, for the year ended December 31, 1921, showed net earnings before dividends amounting to \$512,488. The payment of dividends amounting to \$549,497, however, including a dividend paid on Jan. 1, 1922, reduced the total surplus \$37,009. Current liabilities were reduced from \$2,210,271 to \$410,083.

A single bid was entered on the property of the defunct John Obenberger Forge Co., Milwaukee, at the public sale of the assets conducted March 1 by J. F. Gerdis, trustee. The bid was in the sum of \$233,000 and was entered by Adolph H. Weldner, attorney, on behalf of secured creditors. The appraised value of the property is \$955,242. The referee in bankruptcy has declined to accept the bid and instructed the trustee to call for new bids until March 20.

The Motor Wheel Corporation, Lansing, Mich., manufacturer of motor vehicle wheels, metal stampings and other steel products, reports a net profit of \$301,340.89 in 1921, after deductions for Federal taxes. The balance sheets show the company to be in excellent condition, with liquid assets of \$1,812,598.64 and current assets of materials, \$1,939,506.62, a total of \$3,752,105.26. Current liabilities amount only to \$273,691.48. H. F. Harper is president and general manager of the corporation.

The Lima Locomotive Works, Inc., Lima, Ohio, for the year 1921 shows a net income after charges and Federal taxes of \$1,136,591, equivalent after preferred dividends are paid to \$21.51 a share on the \$4,350,000 of common stock. This compares with a net income of \$1,078,730, or \$20.18 a share in the previous year.

The Wheeling Steel Corporation has declared the quarterly dividends of 1 per cent on the preferred A stock and 1½ per cent on the preferred B stock, payable March 18.

Westinghouse Electric & Mfg. Co. has declared the regular quarterly dividends of 2 per cent on its preferred and common stock. The preferred dividend is payable April 15 and the common dividend April 29, both to stockholders of record March 31.

After taking an inventory shrinkage of \$299,114, the Atlas Tack Corporation, Boston, showed a net loss in 1921 of \$403,213, as against a net profit in 1920 of \$130,853 or \$1.37 a share on the 85,000 outstanding shares. Sales last year were \$1,809,121, contrasted with \$3,044,265 for 1920. The assets and liabilities at the close of 1921 were \$3,082,672, whereas at the close of the previous year they were \$2,437,789.

A meeting of the stockholders of the Standard Steel Car Co. has been called for May 2, at Pittsburgh, to vote on an increase in the capitalization from \$5,000,000 to \$50,000,000.

The annual report of the American Hardware Corpora-

tion, New Britain, Conn., shows net profits after adjustments and depreciation of \$852,545, and a surplus, after \$793,600 paid out in dividends, of \$58,945. In 1920 the net profits were \$1,456,357, dividends \$1,190,400, and the surplus \$265,957.

Employees of the Stanley Works, New Britain, Conn., hardware, are given an opportunity to purchase on easy payments common stock at \$44 a share. Last year about 700 employees bought \$187,200 of common stock.

The Toronto Laundry Machinery Co., Ltd., 1947 Dundas Street West, Toronto, Ont., manufacturers of laundry machinery and ice-making machinery, has assigned to G. T. Clarkson. The company was incorporated in 1903, with \$40,000 capital stock and the late John O'Neill was president and chief stockholder, and J. C. O'Brien was managing director.

Stockholders of Harbison-Walker Refractories Co. will meet May 15, to vote upon a proposition that the capital stock be decreased from \$36,600,000 to \$30,000,000, the decrease to be made by the retirement and cancellation of \$6,600,000 of preferred stock now in the treasury of the company.

Plans of New Companies

George F. Merrell, Inc., is manufacturing its Wash-All washing machine by contract and will probably continue to do so for some time.

The Fire-Grate-Radiator Heating Corporation, 302 West Clinch Avenue, Knoxville, Tenn., will do its own manufacturing and will be in the market at an early date for general equipment for foundry and machine shop.

P. W. P. Mfg. Co., 64 William Street, Newark, N. J., expects to build wireless apparatus.

F. W. Reisman and L. E. Turk, formerly traveling sales manager and treasurer respectively, of Quigley Furnace Specialties Co., have with others organized and incorporated the Keystone Refractories Co. and will manufacture high temperature cements and granular refractories. Offices will be located at 120-122 Liberty St., N. Y. and factory in Jersey City. Mr. Reisman is president and general manager and Mr. Turk secretary and treasurer of the new company.

The Marlin Wire Wheel Corporation, 366 Madison Ave., New York, is the incorporation of the wire wheel business formerly conducted by Marlin-Rockwell Corporation at Philadelphia, under the Rudge-Whitworth patents. The conduct of the business will be the same as formerly, under the name of The Marlin Wire Wheel Corporation.

The Craine-Schrage Steel Co., 6189 Greenwood Ave., Detroit, Mich., has been organized by W. C. Schrage, secretary and treasurer, who was long identified with the Pittsburgh Shafting Co., of Detroit, a subsidiary of the Columbia Steel & Shafting Co. of Pittsburgh, and C. P. Craine, who also was associated with that company for a period of years and later took over the account of the Wyckoff Drawn Steel Co., Pittsburgh, and the Columbia Steel Co., Elyria, Ohio, as district manager of sales. These two men have joined forces with a view of facilitating the two mill representations and carrying an extensive warehouse stock of cold-drawn steel and cold-rolled strip steel.

The Twin Steam Trap Corporation, 1019 Dime Bank Bldg., Detroit, will be in the market for manufacturing equipment within 30 to 60 days.

A. W. Lau, formerly of the Lau Iron Works, has organized the Steel City Iron Co., capitalized at \$100,000, at Youngstown, Ohio, to manufacture ornamental iron and structural steel. The company plans to erect a factory and warehouse in the Spring. It will carry a general stock in warehouses to enable industries and contractors to obtain its products without delay. Among the products it will handle are metal doors, metal window casings, concrete bars and fireproofing materials. Temporary offices have been established at 311 Federal building, Youngstown.

Henry J. Reeve and James E. Fritts have incorporated the Reeve-Fritts Co., 37 South Desplaines Street, Chicago, and will handle all types of metal-working machines. Mr. Reeve was one of the organizers of H. A. Stocker Machinery Co. in 1905 and continued with that company until its consolidation with the Rumely-Wachs Co. in 1917. From that date until about a year ago Mr. Reeve was treasurer of the Stocker-Rumely-Wachs Co., following which he was associated with the Dale Machinery Co. Mr. Fritts also was formerly with the Stocker-Rumely-Wachs Co.

The Loyd Wireless Telephone Corporation, Sixth Avenue at Forty-first Street, New York, has several factories of its own making wireless apparatus, but at the present time it is greatly delayed in making deliveries and expects shortly to place over \$2,000,000 worth of contracts with outside concerns.

Machinery Markets and News of the Works

BUYERS ARE SLOW TO CLOSE

Orders in Small Volume Compared to Inquiries Recently Quoted On

General Business Improvement, However, Brings a More Cheerful Sentiment

Though two months of the new year have passed, very little of the expected improvement in machine-tool business has materialized. The volume of inquiry has been larger than at any time last year, but orders are only slightly more numerous. The trade is hopeful, however, that the larger number of inquiries is a promising sign of better business to come as soon as greater confidence has been established.

A good demand for machine tools from manufacturers of wireless telephone equipment is predicted.

This business has grown amazingly and a number of manufacturers are anticipating increasing their capacity.

The past week has been lacking in significant new developments. There has been a little buying, but on the whole trade is still very quiet. A Cincinnati builder received an order for 15 drilling machines; another company in that city received an order for eight machines. The Fisher Ohio Body Co. has bought a small quantity of shop equipment at Cleveland. The New York Central bought two tools and the Delaware & Hudson is closing on a small list. The Illinois Central is expected to put out a list soon for a year's requirements.

The Monarch Machine Tool Co., Sidney, Ohio, has reduced prices on its lathes 10 per cent.

Manufacturers of electric motors have reduced prices about 10 per cent.

New York

NEW YORK, March 7.

The outstanding fact in the machine-tool trade is that the number of orders which have been placed since the first of the year is in very small ratio to the number of machines for which inquiries have been received. The inquiries may, and perhaps do, indicate the interest of tool users in new equipment, but the dearth of orders also indicates that business recovery has not yet proceeded far enough to permit many of them to make the purchases they consider desirable.

No definite trend toward improvement in business in this market was discernible in the past week. The general observation of sellers is that business continues "extremely dull."

The Delaware & Hudson Railroad at Albany, N. Y., has placed an order for a boring mill and will probably place other orders this week, its requirements including a wheel press and a driving-box borer. The Sewell Valley Railroad has bought a 20-ton Niles crane and a 36-in. planer.

Present activity in the crane market is about on a par with previous weeks. One or two new inquiries are reported current and some orders have been placed. Among orders pending, which will probably be placed within the next few days, is the inquiry of the Public Service Production Co., Newark, N. J., for a 25-ton, 50-ft. boom locomotive crane for Burlington, N. J. Among hand power crane builders, but little activity is noted except in parts for replacement.

Among recent sales are: Cleveland Crane & Engineering Co., 60-ton, 24-ft. span, 1-motor, power house crane to the Phoenix Utilities Co., New York, for a power house in Wilkes-Barre, Pa.; Industrial Works, a 20-ton, 50-ft. boom locomotive crane to the Southern Pacific Co., 165 Broadway, New York, for West Oakland, Cal., a No. 3 pile-driver to the Canadian Pacific Railroad, Montreal; and a 10-ton crawl tread locomotive crane to Stone & Webster for use at Philadelphia; Philip T. King, 30 Church Street, New York, a 20-ton, 60-ft. boom used Ohio locomotive crane to the Industrial Service Co., Lincoln, N. J.; Niles-Bement-Pond Co., a 20-ton overhead traveling crane to the Sewell Valley Railroad Co., Rainelle, West Va.; Dravo-Doyle Co., a Dravo-Doyle Whirley to the Hainesport Mining & Transportation Co., Philadelphia.

Eugene Forrer, Budd Lake, N. J., contemplates building an iron and brass foundry near New York City next summer. He will manufacture pipe fittings of an ew type, also, hotel and bottlers' machinery pumps, valves, stop cocks, etc., and will be in the market for shop equipment.

The National Filter Cloth & Weaving Co., 57 Hope Street, Brooklyn, manufacturer of wire cloth, is having plans

prepared for a one-story brick plant, 70 x 200 ft., on property recently acquired at Hamden, Conn. Equipment will be installed for the employment of about 100 operatives.

The Eastern Malleable Iron Co., Twenty-fifth Street, Troy, N. Y., is taking new bids on revised plans for a one-story power plant on site, 50 x 188 ft.

The Todd Shipyards Corporation, 25 Broadway, New York, is planning for the establishment of a ship repair plant on property at Mobile, Ala., recently acquired from the Mobile Shipbuilding Co. It will be operated as a direct branch of the other plants of the company. William H. Todd is president.

Coal-handling equipment will be installed at the new 300-ton coal bunker, 80 x 128 ft., to be constructed by Michael Di Leo, Port Chester, N. Y. Frank Urso, Stamford, Conn., is architect.

Bids will soon be asked for a four-story ice-manufacturing and cold storage plant, 75 x 110 ft., on Webster Avenue, New York, for E. M. Schildwachter, 4130 Park Avenue, estimated to cost about \$1,000,000 with machinery. William H. Meyer, 1861 Carter Avenue, architect, is completing plans.

The Empire Switchboard Co., Inc., New York, has been organized to take over the plant and business of the Empire Engineering & Supply Co., Fourth Avenue and Twenty-eighth Street, Brooklyn, and will continue the manufacture of electrical equipment. Norman P. Findley, manager of the former company, is president and C. E. Schoninger, secretary.

The Detroit-Cadillac Motor Co., Bernard Avenue, Poughkeepsie, N. Y., will take bids at once for a three-story service and repair building, 63 x 105 ft., at Mill and Washington streets. E. C. Smith, 39 Market Street, is architect.

The Ford Motor Co., Detroit, Mich., will commence the erection of its proposed tractor plant at Green Island, N. Y., early in May, for the manufacture of Fordson tractors, motors, and other automotive products, estimated to cost in excess of \$750,000, including machinery. It will give employment to about 10,000 persons when running full. Construction is well under way on a hydroelectric generating plant for works operation, estimated to cost \$2,000,000. Machinery installation will commence in the spring and it is expected to have the plant ready for service in June or July. Stone & Webster, 147 Milk Street, Boston, are engineers.

Freight-handling and conveying machinery, cranes, etc., will be installed in the five-story warehouse and loft building, and two-story superstructure on a pier 580 ft. long to be constructed at Havana, Cuba, by the Havana Docks Corporation, under a lease for the United Fruit Co., 17 Battery Place, New York. The structures will approximate 320,000 sq. ft. of space. Contract for the building has been let to the Turner Construction Co., 242 Madison Avenue, New

York, and will require more than 12 months for completion. Parsons, Klapp, Brinckerhoff & Douglas, 84 Pine Street, New York, are architects and engineers.

The Driscoll Transmission Corporation, New York, has leased the eighth floor of the building at 416-22 West Thirty-third Street, for headquarters for the production of the Driscoll variable speed transmission. Occupancy will be taken at once. Col. M. W. Thompson is chairman of the board.

Merkel Brothers, Chichester Avenue, Jamaica, L. I., will commence the immediate erection of a three-story ice and refrigerating plant, 60 x 75 ft., adjoining their present works. Louis Allmendinger, 20 Palmetto Street, Brooklyn, is architect.

W. C. Durant, president Durant Motors, Inc., 1819 Broadway, New York, is arranging for the manufacture of a complete four-cylinder, five passenger automobile to sell for \$348. Plans will be developed at an early date for facilities for quantity production with a number of branch works in different parts of the country for assembling. It is understood that the car will be handled by a separate organization, the Durant company contracting for the production only. The regular Durant automobile is now being manufactured at the Long Island City plant of the company, which is operating full under a daily production of 100 cars, and the new automobile will have no connection with this plant.

The Board of Estimate, Municipal Building, New York, is considering an appropriation of \$500,000 for the Department of Plant and Structures, Municipal Building, Grover A. Whalen, commissioner, for the construction of dry docks and shops for municipal marine work. About \$200,000 will be used for the shop buildings and machinery.

The New York Edison Co., Irving Place and Fifteenth Street, New York, will commence the immediate erection of a one-story power house, 50 x 100 ft., at Park Avenue and 188th Street, to cost about \$75,000. A new power house will also be built at Yonkers, N. Y., to cost approximately \$250,000. William Whitehill, Buckley-Newhall Building, Forty-first Street and Sixth Avenue, is architect and engineer.

Charles Cohen, 308-10 Oakland Street, Brooklyn, manufacturer of automobile bodies, has filed plans for a two-story brick addition, 25 x 100 ft.

W. L. Fleisher & Co., 31 Union Square, West, New York, engineers, have leased the two-story building, 50 x 150 ft., on South Washington Place, Long Island City, for a mechanical works and laboratory.

The Central Steamship & Commerce Corporation of New York has commissioned Theodore D. Wells, 11 Broadway, naval architect, to prepare plans for 15 freight vessels, to be equipped with Diesel engine electric drive, power plants, refrigerating machinery, hoisting and freight handling machinery, and other equipment. The freighters are estimated to cost \$5,000,000, and will be used for service between New York and Chicago, on the New York and Welland barge canals.

A vocational department will be installed in the new junior high school to be erected in the Greenville district, Jersey City, N. J., for which an appropriation of \$1,560,000 has been asked. Work will commence at an early date.

Fire, March 1, destroyed the two-story building at Tenth Street and Jersey Avenue, Jersey City, N. J., owned by the Erie Railroad Co., and occupied under lease by the Pullman Co., manufacturer of railroad cars, with loss estimated at about \$50,000, including equipment and supplies.

The Eastern Steel & Wire Co., Newark, N. J., is completing arrangements for the purchase of land on Evergreen Avenue, as a site for a new plant to manufacture carriage springs, agricultural implements and general wire products. Contract has been let to the American Concrete Steel Co., 27 Clinton Street, for a one-story structure, 180 x 520 ft., and ground will be broken about April 1. It is estimated to cost about \$300,000. E. A. Henry, formerly connected with the American Steel & Wire Co., Pittsburgh, is president of the company, which was incorporated recently with a capital of \$1,000,000. It is represented by Bilder & Bilder, 790 Broad Street.

Officials of the Submarine Boat Corporation, Port Newark, Newark, have organized a third subsidiary to carry out features of its operations, including steel fabricating, boat construction, terminal operations, etc. The new company will be known as the Newark Bay Terminal Corporation, and will develop a freight terminal, with facilities for storing, handling and conveying materials.

Export Opportunity

Anton Franz Mörtel, Nuremberg, Germany, is in the market for machinery for the manufacture of conical and square shaped chalks for writing purposes.

Chicago

CHICAGO, March 6.

The first week in March was very quiet in the local machine tool market. Some sales of individual machines are being made, but in most cases they are either second hand, or new equipment disposed of at low prices. It is evident that buyers are looking for bargains. The railroads have taken no further action on their pending lists, but the Illinois Central is still working on a three-year program and is expected to put out a list for the first year's requirements soon.

An auction on March 2 in liquidation of the equipment of H. C. Williamson's plant at 321 North Crawford Avenue, Chicago, brought out nothing unusual in the way of prices, some being high and others relatively low. It is to be noted, however, that of the extensive list of machines offered, some 40 per cent failed to bring out any bids.

A pending inquiry from the Universal Portland Cement Co., Buffington, Ind., calling for a number of large machine tools, is still unclosed. The Illinois Steel Co. has asked for prices for estimating purposes on a number of carwheel boring machines, axle lathes and other equipment similar to that in its Gary wheel works.

The Filer & Stowell Co., Milwaukee, has ordered a No. 8 Whiting cupola.

Building permits were taken out in Chicago in February for 634 structures, fronting 20,998 ft. and costing \$13,493,800, as against 311 permits involving 10,608 ft. frontage and \$15,366,000 for the corresponding month of last year. It will be noted that gains were recorded in the number of buildings and in frontage, but a decrease in cost. The total cost of buildings covered by permits issued in February, 1921, however, was the highest in the history of the city.

The Popular Mechanics Co., 6 North Michigan Avenue, Chicago, has taken out a permit for the construction of a seven-story printing office building, 85 x 119 ft., at 202-208 East Ontario Street, to cost \$300,000.

The Bassick Mfg. Co., manufacturer of lubricators and automobile accessories, 361 West Superior Street, Chicago, has purchased the one-story plant of E. Edelmänn & Co., manufacturers of automobile specialties, 2638 N. Crawford Avenue. The plant contains 63,000 sq. ft. of floor space and is served by the Chicago, Milwaukee & St. Paul Railroad. The Edelmänn company has leased space in the Krasberg Building in East Ohio Street, where it will move its factory and assembling plant.

The Alfred Johnson Skate Co., 2812 West North Avenue, Chicago, is receiving bids on a four-story plant, 50 x 138 ft., at West North and Francisco avenues, to cost \$100,000.

Wagner Brothers, dealers in real estate, 6236 Cottage Grove Avenue, Chicago, have let contract for a one-story automobile salesroom and repair shop, 100 x 108 ft., 6521-31 Cottage Avenue, to cost \$25,000.

J. Smith has let contract for a one-story sheet metal shop, 40 x 74 ft., 2118 South California Avenue, Chicago, to cost \$18,000.

The B & B Motor Co., 1106 Granville Avenue, Chicago, has let contract for a one-story garage, 65 x 230 ft., 6019-23 Broadway, to cost \$30,000.

Charles F. Trapp, 5350 West Chicago Avenue, Chicago, has let contract for a one-story Ford automobile service station, 100 x 127 ft., to cost \$45,000.

The Jefferson Ice Co., Bickerdike Street near Grand Avenue, Chicago, has let contract for a one-story ice plant, 124 x 125 ft., 1445 North Crawford Avenue, to cost \$32,000.

W. J. Kehl, 1225 North Maplewood Avenue, Chicago, has awarded contract for a one-story machine shop, 75 x 111 ft., 1722-28 Walnut Street, to cost \$15,000.

An explosion of paint and oil barrels resulted in a fire which destroyed the plant of Shauger & Johnson, sheet metal manufacturers, Atlantic, Iowa, on Feb. 28. The loss is estimated at \$100,000.

The Arcade Mfg. Co., Freeport, Ill., manufacturer of molding machines, hardware products, etc., is taking bids for a three-story addition, 65 x 100 ft., estimated to cost about \$35,000. B. C. Trueblood is treasurer.

The Common Council, Oskaloosa, Iowa, has plans under way for a municipal hydroelectric generating plant on the Des Moines River, near Harvey, estimated to cost about \$350,000, with machinery. The Fargo Engineering Co., Jackson, Mich., is engineer.

Hendrickson Brothers, Wolverton, Minn., operating a sand and gravel plant, are planning for the installation of new equipment, including gasoline cranes, conveying machinery and loading apparatus.

The Swartz Mfg. Co., Inc., Freeport, Ill., recently organized, will take over and operate the plant and business

of the Swartz Iron Foundry, specializing in the manufacture of pistons for automobile engines. Increased production is planned. Carl H. Swartz, heads the company.

Peterson & Johnson, 406 Swedish-American Bank Building, Rockford, Ill., architects, are preparing plans for a one-story power house to be erected in connection with a new local factory, the owner's name being temporarily withheld.

A vocational department will be installed in the three-story and basement high school to be erected at Danville, Ill., estimated to cost about \$500,000. Lewis & Dougherty, 519 Temple Building, are architects.

The Illinois Traction Co., Mayer Building, Peoria, Ill., has preliminary plans under way for a new one-story power house, estimated to cost in excess of \$500,000.

A vocational department will be installed in the new senior and junior high school to be erected at Scottsbluff, Neb., estimated to cost about \$500,000. R. A. Bradley & Co., Hastings, Neb., are architects.

The Casey Hudson Co., automatic screw machine products, states that the report that this company intended to move to Chelsea, Mich., was incorrect, as it has definitely decided not to move out of Chicago.

Philadelphia

PHILADELPHIA, March 6.

A one-story power house will be erected by Martin H. Walrath, Park and Glenwood avenues, Philadelphia, in connection with an addition to his woodworking plant, 67 x 175 ft.

The A. J. O'Neil Co., construction equipment, 1524 Chestnut Street, Philadelphia, is inquiring for a used compressor, capacity about 300 ft. per min. at 50 lb., belt driven or direct connected.

Benjamin Slatko, 336 East Third Street, Philadelphia, manufacturer of lighting equipment, will rebuild his three-story plant, recently partially destroyed by fire.

A power plant will be constructed by Walter E. Knipe & Sons, Hancock Street, Philadelphia, in connection with their new dyeing and finishing works at Wyoming and G streets, estimated to cost \$257,000. W. E. S. Dyer, Land Title Building, is architect and engineer.

The H. T. Paiste Co., 3201 Arch Street, Philadelphia, manufacturer of electrical equipment and supplies, has awarded contract to the Turner Construction Co., 1713 Sansom Street, for a new four-story plant, 104 x 108 ft., at Thirty-second and Cherry streets, to cost in excess of \$100,000. Henry T. Paiste is president.

The Bureau of Supplies and Accounts, Navy Department will receive bids until March 14, for 29,500 pounds of sheet steel for the Philadelphia Navy Yard; also for 400 ball bearings, and until March 28, for a quantity of bolts, screws, washers, etc.

A power plant, oven equipment, conveying and other mechanical equipment will be installed in the five-story plant, 100 x 100 ft., to be erected by the Tasty Baking Co., 2335 Sedgley Street, Philadelphia, on Hunting Park Avenue, estimated to cost \$150,000. The Turner Construction Co., 1713 Sansom Street, is the contractor.

Hexter & Kahn, Morris Building, Philadelphia, have awarded contract to Harry Gill, Jr., 2515 Germantown Avenue, for a one-story automobile service and repair building, 40 x 235 ft., at 5931-35 Broad Street, to cost \$90,000.

The Henry R. Fell Co., East Carroll Street, Trenton, N. J., manufacturer of concrete roofing tile, will build an addition to double approximately, the present capacity. New mixing, pressing and other machinery will be installed.

The Warren Webster Co., Point and Pearl streets, Camden, N. J., manufacturer of heating equipment heating systems, etc., has preliminary plans under way for a new two-story factory on Federal Street. The Ballinger Co., 105 South Twelfth Street, Philadelphia, is architect. Warren Webster is president.

Fire, Feb. 27, destroyed a portion of the plant of the Light, Railway & Equipment Co., Holmes, Pa., manufacturer of mine trucks, rails, switches, etc., with loss estimated at about \$50,000.

The Peters Motor Corporation, Parker & Logan streets, Trenton, N. J., has purchased the former works of the Bethlehem Paper Co., Bethlehem, Pa., for a new plant, including parts manufacture, assembling, etc. Possession will be taken at once and equipment installed. It is proposed to give employment to about 50 persons for initial operations.

John S. Weaver, Lebanon, Pa., will build a new one-story ice-manufacturing plant, 40 x 100 ft., at Weavertown. Plans have been prepared.

A vocational department will be installed in the new two-story junior high school to be erected at Carbondale, Pa.,

for which John Howley, Traders' Bank Building, Scranton, Pa., architect, has been commissioned to prepare plans.

The Defiance Auto Lock Corporation, recently incorporated, is located at 836 Hamilton Street, Allentown, Pa., and advises THE IRON AGE that it will manufacture patented locking devices for automobiles. At first the lock will be manufactured on contract. Later the company expects to have its own shop and will be in the market for stamping press, milling machine lathe, gear cutter, nickle plating outfit and an acetylene welding outfit.

Buffalo

BUFFALO, March 6.

Jewett & Co., stove works, military Road, Buffalo, have awarded contract to the Hydro Construction Co., Mutual Life Building, for a two-story addition, 75 x 95 ft.

The Quale Garage Co., Inc., 2675 Main Street, Buffalo, is planning for a one-story machine and automobile repair shop, 40 x 200 ft. Grant M. Quale is president.

The Fedders Mfg. Co., Inc., 57 Tonawanda Street, Buffalo, manufacturer of automobile radiators, cans and other metal products, has purchased the former plant of the Lautz-Missiquoi Marble Works, Lewis Street, Bridgeburg, Ont., for a new branch plant. Machinery will be installed at once to give employment to about 75 men, to be increased later.

Charles E. Skelton, Syracuse, N. Y., formerly connected with the Skelton-Chapin Co., has organized a company to operate a general machine works at 4025 South Salina Street, for the manufacture of special machinery and parts, with extensive experimental department.

The Yawman & Erbe Mfg. Co., 424 St. Paul Street, Rochester, N. Y., manufacturer of metal filing cabinets, etc., has plans under way for a three-story addition. Smith, Hinchman & Grilles, Detroit, are architects.

Wesley L. Kirchey, 3149 Bailey Avenue, Buffalo, is planning the erection of a one-story machine and automobile repair shop, 32 x 35 ft., in the rear of his present service building.

Electric equipment, hoisting and conveying machinery, etc., will be installed in the elevator plant, 56 x 165 ft., to be erected at Buffalo, by the Archer-Daniels Linseed Co., Twenty-ninth Avenue, S. E., Minneapolis, Minn., estimated to cost \$300,000, including machinery.

The Rochester Gas & Electric Co., 270 Main Street, Rochester, N. Y., will build a new one-story power house on Gorham Street, Canandaigua, N. Y.

John Celinski, Brighton Street, Buffalo, operating a forge shop and general wagon repair works, has plans under way for a one-story addition, 26 x 60 ft.

The Wright Co., Albion, N. Y., recently organized by William D. Wright, Brockport, N. Y., has leased the former plant of the Albion Wood & Metal Products Co., for the establishment of a new factory to manufacture metal and wood specialties.

Cleveland

CLEVELAND, March 6.

Machine tool manufacturers are predicting a good demand for their products from makers of wireless telephone equipment. Popular interest in the radio 'phone has swept the country and manufacturers of wireless telephone apparatus are reported to be crowded with orders. Orders for one or two automatic machines for making radio equipment were placed with a local machine tool builder the past week and inquiries for several other machines have come from the same industry. Some good orders have also been placed for small parts for radio equipment that are made on automatic machines. The manufacture of radio receiving sets will require small machine tools, probably mostly automatic, semi-automatic and screw machines and punch presses.

Local machine tool manufacturers report a marked improvement in the number of inquiries and a slightly better volume of orders. The amount of prospective business indicates that March sales will show a considerable gain over February. A Cleveland machine tool manufacturer has taken an order for a turret lathe for shipment to Japan, his second order from Japan during the past month. When the slump came there was considerable American machinery on hand in Japan, but it is reported that most of this equipment has been disposed of and the trade looks for some activity from this source during the next few months. It is expected that American machinery will be required in Japan for the manufacture of small motor cars, motorcycles and bicycles.

Business with local dealers picked up somewhat the past week, but orders were mostly for single tools. The New York Central Railroad purchased two machines for its Col-

tinwood shops. The Fisher Body Ohio Co. placed some additional machine tool equipment.

Inquiry for electrical equipment shows improvement. The General Electric Co. has just booked a 5000-kw. turbine for the Cleveland Cliffs Iron Co., Warren, Ohio, and an order for two out door sub-stations each with three transformers with a total capacity of 66,000 volts for the Mansfield Sheet & Tin Plate Co., Mansfield, Ohio, and for considerable electrical equipment for the Portsmouth, Ohio, plant of the Wheeling Steel Corporation, the latter order including motor generator sets and large variable speed motors.

The Cleveland Tractor Co., Cleveland, has made a reduction from \$795 to \$595 on its new model farm tractor and plans to increase production from 20 to 60 per cent.

The Ridge Tool Machine Co., Elyria, Ohio, recently incorporated, is reported to be in the market for machinery equipment.

The Leesebeare Machine & Mfg. Co., Fostoria, Ohio, has equipped a plant for the manufacture of piston rings, which is being placed in operation.

The Lincoln Tractor & Implement Co., which has been incorporated with a capital stock of \$1,000,000 will establish a plant in Urbana, Ohio, for the manufacture of tractor plows. It purchased the old plant of the North American Chemical Co., which will be enlarged by the erection of a machine shop, 100 x 250 ft., and a steel and gray iron foundry. R. T. Parish is president; George H. McCracken, vice-president; Lawrence H. Norton, secretary, and Joseph Link, treasurer.

The Blake Pump & Condenser Co., Fitchburg, Mass., is reported to be looking for a new factory location in the Central West, and the Alliance Chamber of Commerce, Alliance, Ohio, is negotiating with the company with a view of having it locate in that city.

The plant of the Franklin Tractor Co., Zanesville, Ohio, has been sold to H. E. Bullock, Chicago, for approximately \$35,000. Mr. Bullock was one of the creditors of the company.

The Cleveland waterworks department, which is planning an extension program this year, will be in the market shortly for 35 valves ranging from 12 to 48 in. in size. The order will aggregate approximately \$100,000.

The Standard Slag Co., Youngstown, Ohio, will shortly begin the erection of a new slag manufacturing plant at Bellaire, Ohio.

New England

BOSTON, MARCH 6.

Sales of machine tools were few and far between the past week, but an increase in inquiries for single machines is noted and for that reason sentiment is more hopeful than during the last of February. Buyers in many instances express a preference for good used rather than new tools, because of the disparity of prices. There is a real scarcity of used equipment in this territory that measures up to requirements, which in a large measure explains that small amount of business booked the past week. At the auction sale last Thursday at the Winnisimmet Shipyard, Inc., Chelsea, Mass., the best machine tools brought good prices, while inferior equipment sold at low figures. The shipyard itself was sold to H. F. Winslow, Boston, for \$200,000. It is assessed for \$800,000.

The most important sale this week of new tools was a 36-in. x 22-ft. lathe to a southern New England textile interest. Other sales include a new 11-in. x 5-ft. new South Bend lathe to a Fall River interest and a 9-in. x 3-ft. to a Portland Street, Boston, chemical laboratory, a 10 x 50 in. used plain Norton grinder and a used Whitney hand milling machine to a North Andover, Mass., textile interest, and a No. 40 used Perkins inclinable power press to a Boston manufacturer. A Vermont marble shipper bought two 2-ton cranes, and a Lowell manufacturer a 5-ton three-motor Northern crane. Stone & Webster have not closed on the new Ford crane inquiry.

The Boston & Maine Railroad is in the market for a gear cutting machine. The Boston & Albany has not yet purchased its brass working lathe. The Central Vermont, the Rutland and the Bangor & Aroostook railroads have asked local dealers to furnish preliminary estimates of certain tools contained in lists considered some time back and set aside for a time, which gives hope the lists are to be put out before long. The Boston Elevated Railway Co. is inquiring for turret tool equipment, but has not decided what it will need for its proposed Everett repair shop to be built later. The Barnett Drop Forging Co., Easthampton, Mass.,

wants two or three high speed drill presses, preferably good used tools, and John E. Stein, Milford, N. H. one 100-lb. board drop hammer.

The small tool business shows expansion and in the aggregate suggests considerable activity among certain shops.

Plans are being drawn for an addition to the plant of the Manchester Traction, Light & Power Co., Manchester, N. H. Barry, Cashman & Co., 200 Devonshire Street, Boston, are engineers.

The W. F. Concannon Shear Co., Milford, Conn., shears and scissors, is about to begin manufacture. It recently was organized with a capital of \$20,000.

The Fairmont Avenue, New Haven, plant, American Steel & Wire Co. will be remodeled to accommodate a new slicing department. The cost of alterations is estimated at \$39,000.

The plant of the Hanscom Cutter Works, Hyde Park, Boston, tool manufacturer, was considerably damaged by fire last week.

The Hampshire Electrical Appliance Corporation, capitalized for \$100,000 has been given a charter to manufacture washing machines, irons, other household devices and mechanical appliances. Laurence K. Foote, Southbridge, Mass., is president; Lewis A. Wilson, Worcester, vice-president, and Ethel S. Brosseau, Southbridge, treasurer. The company is seeking manufacturing quarters in Worcester. Mr. Wilson, during the war, was assistant superintendent Osgood, Bradley Car Co., Worcester, and more recently associated with the Crompton & Knowles Loom Works.

Beaupre Brothers, Franklin, N. H., contemplate rebuilding their foundry. Details have not been worked out.

The announcement in THE IRON AGE on Feb. 23 that the E. Howard Clock Co., Boston, purchased a factory at Peabody, Mass., is denied by the company, which advises that while several factories have been under consideration, including the one at Peabody, no definite action toward the purchase of any property has been taken by the board of directors.

Ricketts & Shaw, Monson, Mass., are considering the installation of new equipment in the power plant at their woolen factory. Reeds & Thorpe, 60 Prospect Street, Hartford, Conn., engineers, will prepare estimates of cost.

The Whitins Machine Works, Whitinsville, Mass., is completing plans for a two-story branch plant, 75 x 160 ft., at Northbridge, Mass. Joseph D. Leland, 41 Mt. Vernon Street, Boston, is architect.

The Oxford Paper Co., Rumford, Me., has completed arrangements for the purchase of the power plant and property of the Rumford Falls Power Co., Rumford. Improvements are being considered. To carry out the acquisition, the company has arranged for a bond issue of \$5,000,000.

The Builders' Iron & Steel Co., 262 Bridge Street, Cambridge, Mass., has construction under way on a new branch plant at Everett, Mass., 70 x 250 ft., and office building, estimated to cost \$65,000. H. F. Thatcher, Malden, Mass., is architect.

A one-story automobile service and machine repair works, 75 x 135 ft., for company cars, will be constructed at Cambridge, Mass., by the National Bottling Co., 28 School Street, Boston, estimated to cost about \$45,000.

The Atlantic Refining Co., 3144 Passyunk Avenue, Philadelphia, has preliminary plans under way for a new branch oil refinery at Fall River, Mass., estimated to cost about \$1,000,000, including equipment.

The Board of Education, Providence, R. I., has plans nearing completion for a new central power house on Pond Street, for service at the high school buildings, estimated to cost \$160,000. Bids will be asked at an early date.

A vocational department will be installed in the proposed junior high school to be erected at Ware, Mass., estimated to cost about \$150,000.

The Savage Arms Corporation, 50 Church Street, New York, has taken title to the plant of the J. Stevens Arms Co., Chicopee Falls, Mass., heretofore held by the Westinghouse Electric & Mfg. Co., Pittsburgh, for approximately \$1,500,000. The purchasing company has been operating at the plant for a number of months.

The Bureau of Yards and Docks, Navy Department, Washington, has completed plans for a new dry dock and power house at the South Boston Navy Yard, and will call for bids under schedule 4550.

The American Electric & Maintenance Co., 51-57 Taylor Street, Springfield, Mass., has work under way on a new plant, 128-130 ft., for electrical repair and parts production. A. M. Sofield is president and general manager.

Detroit

DETROIT, March 6.

The Pere Marquette Railroad Co., Detroit, has plans under way for new car and locomotive shops at Grand Rapids, Mich., to cost about \$1,000,000, including equipment.

The Kirchen Machine Co., Lansing, Mich., has commenced the erection of an addition, to increase the capacity of the general machine department. A portion of the present works will be remodeled.

The Hirsch Mfg. Co., Sturgis, Mich., manufacturer of metal products, has awarded contract to the Citizens' Lumber Co., Sturgis, for a three-story and basement addition, 130 x 200 ft., to cost about \$100,000. Work will commence at once. E. S. Batterson, 405 Hanselman Building, Kalamazoo, Mich., is architect and engineer. C. Hirsch is president.

The Ford Motor Co., Detroit, is arranging to operate power plants of sufficient capacity to provide for all of its works, and has plans under way for increased construction for this purpose. The plant of the Lincoln Motor Co., a recent acquisition, will also be operated by power from the River Rouge generating station of the company. The entire project is estimated to cost in excess of \$400,000.

The Anchor Concrete Machinery Co., Rock Rapids, Iowa, manufacturer of concrete brick and block-making machinery and parts, has acquired the plant and adjoining property of the Adrian Steel Castings Co., Adrian, Mich., for a new factory. Operations will begin at once. The company was incorporated recently with a capital of \$100,000.

Coal-handling and conveying machinery will be installed at the new storage bins, 56 x 200 ft., to be erected by the Scheiwe Coal & Coke Co., 6356 Mack Avenue, Detroit. William Hurt is secretary. F. W. Weidmaier, 412 Campau Building, is architect.

The Cadillac Machinery Co., Boydel Building, Detroit, is in the market for a used 53½ Toledo or 80½ Bliss press or equivalent.

Cincinnati

CINCINNATI, March 6.

While no large orders were reported sales the past week showed an improvement over the week preceeding and the indications are that March will show more bookings than February. The largest order during the week was for eight machines. An inquiry for 15 drilling machines came out but is said to be only for appraisal purposes. Most of the inquiries received are for single machines but many manufacturers are looking for much better business as a result of these inquiries. It is expected that several railroad lists will shortly be issued, as manufacturers state some interest is being shown by purchasing agents. The used machinery market is holding up fairly well, although the month of February was poor compared with January. The only price change of note the past week was that by practically all manufacturers of electric motors, reductions of 10 per cent becoming effective Feb. 27.

The Indianapolis Frog & Switch Co., Springfield, Ohio, has purchased 16 acres adjacent to its property and while no immediate building expansion program is planned, the additional ground will be used to provide more trackage for the company and to enable it to turn out a wider diversity of product.

The Boyet-Ledder Mfg. Co., Covington, Ky., has been incorporated with a capitalization of \$15,000 to manufacture mechanical toys. John F. Boyet and Frederick G. Ledder, Covington, are the incorporators.

Baltimore

BALTIMORE, March 6.

An electrically-operated pumping plant will be installed in connection with the proposed new waterworks to be constructed by the Common Council, Williamsport, Md., estimated to cost about \$100,000.

The Hanson Motor Co., Atlanta, Ga., manufacturer of automobiles, has acquired the plant and property of the American Motors Export Co., Jacksonville, Fla., for a branch, maintaining headquarters at Atlanta. The capacity will be increased.

A crane runway, 72 x 702 ft., to cost about \$30,000, will be constructed by the Weyerhaeuser Timber Co., Lexington Building, Baltimore, at First Avenue and Charles Street.

A. E. Anderson and W. N. Canter, Bristol, Va., are organizing a company to establish a plant for the manufacture of nickel, brass and other metal specialties.

The Common Council, Enfield, N. C., is taking bids until

March 15 for a new municipal power plant, and pumping machinery for the waterworks department. William C. Olsen, Kinston, N. C., is consulting engineer.

J. C. Steele & Sons, Statesville, N. C., manufacturers of brick-making machinery, are making inquiries for a number of machine tools for installation at their plant, including boring mill, heavy duty lathe, planer, bolt-threading machine, and other equipment.

The Atlantic Ice & Cold Storage Co., Kirkwood, near Atlanta, Ga., is arranging for the erection of a new cold storage plant to cost about \$40,000.

The Pittsburgh Plate Glass Co., Pittsburgh, is contemplating the construction of a four-story addition to the plant of its Rennous-Kleinle Division, 3221 Frederick Avenue, Baltimore, 75 x 205 ft.

The General Purchasing Officer, Panama Canal, Washington, is taking bids, with no closing date stipulated, for 1000 seamless brass condenser tubes.

The Office of the Chief of Air Service, United States Army, Washington, D. C., is taking bids until March 30 for a quantity of seamless annealed copper tubing.

A vocational department will be installed in the high school to be erected at Roanoke, Va., estimated to cost about \$500,000. A similar department will be installed in the new junior high school to be constructed in the South East section, at a cost of about \$130,000. D. W. Persinger is chairman of the board.

The Elizabeth City Iron Works, Elizabeth City, N. C., has plans under way for the construction of a new dry dock and ship repair plant, with general machine shops, estimated to cost close to \$60,000. The installation of a marine railroad is also being considered. Henry and Andrew Sanders head the company.

Indiana

INDIANAPOLIS, March 6.

The Huntington Ice Co., Inc., Huntington, Ind., is contemplating the erection of a new two-story ice-manufacturing plant to cost about \$50,000.

The United States Government Engineers, Evansville, Ind., have surveys under way for a hydroelectric power plant at Newburg, estimated to cost in excess of \$2,000,000.

The Bloomington Brick & Tile Co., Bloomington, Ind., has plans nearing completion for its new works at Unionville, Ind., estimated to cost about \$200,000, including machinery. A. W. Beecher is president.

The Madison County Superior Court has approved of the sale of the plant and property of the Buckeye Mfg. Co., Anderson, Ind., manufacturer of motor driven tractors and engines, to James W. Sansberry, Anderson, on his bid of \$45,100.

The Midwest Utilities Co., Chicago, a subsidiary of the Commonwealth Edison Co., has acquired the electric plants and property of the Hawks Electric Co., Goshen, Ind., and the Winona Light & Water Co., Warsaw, Ind. The new owner is contemplating extensions in the plants and systems.

Milwaukee

MILWAUKEE, March 6.

Although the machine tool trade is lacking in volume and is devoid of feature, the feeling exists that progress is being made by metal-working industries in getting new business, which sooner or later must be reflected in increased requirements of machine tools. The call for used equipment is relatively better than for new tools, but this is believed to presage the time when the absorption of used equipment will have reached the point where new tools will again have a fair chance of a real market. Foundry operating schedules are steadily increasing and machine shops are feeling a beneficial effect. The automotive industries the past week or two have broadened their inquiries and some milling machine business has resulted. A few sales of miscellaneous machinery have been made to makers of tractor parts and agricultural implements, with improved prospects for more business in 30 to 60 days.

The C. A. Shaler Co., Waupun, Wis., manufacturer of vulcanizing and tire repair apparatus, headlight lenses and other automotive specialties, sustained a loss of close to \$350,000 by fire March 2. The factory, equipment and warehouses are practically a total loss. C. A. Shaler, president and general manager, at present in California, telegraphed March 3 to prepare immediately for the erection of a new plant of fireproof construction, details of which are not yet available. R. B. Dunlap is secretary.

The International Harvester Co., 217 Oregon Street, Milwaukee, will build a garage and service shop costing about \$45,000 at 85-89 Reed Street. Construction contracts have been let.

The Interior Woodwork Co., Park Street and Fifth

avenue, Milwaukee, is in the market for some additional equipment, for a three-story manufacturing addition, 67 x 125 ft., and a storage and stock addition, two stories, ell-shaped, 90 x 101 ft. The architect is Herman J. Esser, Camp Building. The work will cost about \$100,000 in all.

The Peerless Traveling Goods Co., Mayville, Wis., manufacturer of trunks, bags, etc., has plans for a new factory, two and three stories, 60 x 120 ft., of brick and mill construction, with a separate one-story office building. Considerable new machinery, including special tools for making steel frames and other metal parts, will be installed. The investment is estimated at about \$75,000.

The Molle Typewriter Co., Oshkosh, Wis., manufacturer of writing machines, is raising \$50,000 by an issue of two-year, 7 per cent notes, to provide additional working funds and finance purchases of supplementary equipment and materials. No extension of buildings is contemplated at present. R. D. Wynn is president and general manager.

The Seamweld Equipment Co., 314 Winnebago Street, Milwaukee, has changed its corporate style to the Fred Pabst Co., and proposes to enlarge its line of activities in the metal-working field. It is controlled by Frederick Pabst, president Pabst Corporation, formerly Pabst Brewing Co., and occupies part of the former brewery group.

The Oswald Jaeger Baking Co., 914-922 Central Avenue, Milwaukee, which is erecting a \$150,000 addition to its bakery, has let the contract for a new refrigeration plant to the Vilter Mfg. Co., Milwaukee.

The Simplex Alarm Co., 129 Michigan Street, Milwaukee, manufacturer of patented burglar alarms and similar specialties, has increased its capitalization from \$75,000 to \$150,000 to accommodate the growth of its plant and business.

The U. S. Tractor & Machinery Co., Menasha, Wis., at its annual meeting authorized an increase in capital stock from \$500,000 to \$1,000,000 and a bond issue of \$250,000 to provide for the construction of a new foundry and additions to the machine shop, assembling floors and storage buildings. These will enable the company not only to manufacture practically all parts of its tractors and tractor implements, but to enlarge the line to embrace other power farm equipment. Officers were re-elected as follows: President, J. M. Robinson; vice-president, G. D. Harris; secretary, Joseph G. Saller; treasurer, A. B. Jensen. Plans are in preparation and it is hoped to start construction work by April 1.

Carl Girnau & Co., 118 South River Street, Eau Claire, Wis., machinists and automobile repairers, have plans for a new shop, 80 x 110 ft., one story, of brick, with steel-trussed roof. With equipment it will cost about \$28,000.

The C. W. Dickover Mfg. Co., Tomah, Wis., has been incorporated with a capital stock of \$25,000 to manufacture shop equipment, fixtures and tools, principally equipment for garages and repair shops. The incorporators are Charles W. Dickover, Alex M. Henry and Earl W. Henry, all of Tomah. The present shop is to be enlarged materially in the spring.

The Madison, Wis., board of public works expects to take bids soon for the installation of two standby generating units, with gasoline engine drive. A portable pumping unit with a capacity of 1000 gal. per minute also will be purchased.

G. A. Huck, Sturgeon Bay, Wis., is organizing a new corporation with a capital stock of \$250,000 to take over the so-called Green stone quarries in Sawyer, a suburb, and install electrically-operated quarrying, conveying, crushing and other machinery, hoppers, screens, etc., estimated to cost more than \$125,000.

The Wisconsin Public Service Co., Green Bay, Wis., has let contract to J. R. McDonald, Iron Mountain, Mich.; for a new reinforced concrete dam at Johnson Falls, on the Peshigo River, as the first part of work on a \$500,000 hydro-electric generating project, previously noted. Contracts for the power house will be let within a short time. Specifications of equipment are in preparation. D. R. Phenecie is vice-president and general manager.

The Brill-Saunders Machinery Co., Appleton, Wis., has been organized with a capital stock of \$150,000 by S. A. Saunders, E. L. Brill and W. H. Blake to manufacture machinery, tools and fixtures.

The Board of Education, Superior, Wis., has engaged B. E. Johnson, local architect, to design a new vocational training school building, to be known as the Webster Memorial High School, and cost about \$100,000. Bids will be taken some time in April or May. W. J. Whipple is president of the board.

The Bachman Electric Co., Fond du Lac, Wis., has purchased the entire business and equipment of the M. C. Smith Electrical Repair & Supply Co., and will employ it as a department for rebuilding and repairing motors, rewinding armatures, and otherwise serving industrial electric power

users. M. C. Smith has become associated with the Bachman company as manager of the new department.

O. M. Johnson, River Falls, Wis., has opened a general sheet metal working shop in the Ostness Building. Most of the equipment needs have been provided for.

The American Hide & Leather Co., Chicago, contemplates improvements in its tanneries at Sheboygan, Wis., the principal work being to remodel the power plant and boiler house, install a coal and ash conveyor system and automatic stokers. Edward A. Juul, Sheboygan architect, is preparing plans.

Pittsburgh

PITTSBURGH, MARCH 6.

Activities in the machinery and equipment market lately have been limited. Inquiries the past week have shown a marked falling away and only a few sales of importance have been concluded. Five cranes recently inquired for by the Riter-Conley Co. have been awarded to Manning Maxwell & Moore, Inc., distributor of the Shaw cranes. The order is for one 10-ton, two 7½-ton and three 3-ton cranes. The latest word about the cranes inquired for by the Wheeling Steel Corporation is that the company is urging makers to have prices in by the latter part of this week, and the expectation is that some, and possibly all of the 20 cranes, will be placed at an early date. There is also a possibility that the National Tube Co. will close soon for a 15-ton crane for its Christy Park works, McKeesport, Pa. Very low prices are understood to prevail for cranes. So few of the makers have any considerable amount of business on their books, that competition for orders is unusually sharp.

Machine tool sales usually are for individual tools, as the shops in and near Pittsburgh are merely replacing obsolete or worn out machines. There is no evidence yet of railroad buying. Eastern systems appear to be recovering less rapidly than those in the West, and railroad equipment manufacturers in this vicinity are not getting much business.

Mechanical conveying equipment, etc., will be installed at the two asphalt plants to be constructed by the county commissioners, Pittsburgh, for the Highway Department. Bids for the buildings and machinery will be asked at an early date. Roy D. Schooley, county road commissioner, is in charge.

D. S. Milloy, Twelfth and Cascade streets, Erie, Pa., manufacturer of planing mill products, has construction under way on a three-story addition, 80 x 200 ft.

A vocational department will be installed in the two-story and basement junior high school to be erected at Twenty-third and Cascade streets, Erie, Pa., estimated to cost \$350,000. W. W. Myers, Library Building, is architect.

The T. & A. Brass Foundry Co., P. O. Box 668, Charleston, W. Va., recently organized, will operate a plant to manufacture roller bearing wheels for traction cars, brass, bronze and aluminum castings, etc. E. T. Thayer is president and manager.

The American Car & Foundry Co., Huntington, W. Va., has issued a call for bids on a general contract for an addition to its plant on Third Avenue, to cost close to \$500,000, including machinery. Headquarters of the company are at 165 Broadway, New York. J. W. Ensign is district manager at Huntington.

The American Thermos Bottle Co., Madison Avenue and Forty-sixth Street, New York, has tentative plans under consideration for a new manufacturing unit at its plant at Huntington, W. Va., totaling about 100,000 sq. ft. of floor space. William B. Walker is president.

The Eagle Mfg. Co., Wellsburg, W. Va., manufacturer of oil containers and other metal products, is planning to immediately rebuild the portion of its factory recently destroyed by fire. W. C. Jacobs, assistant secretary, is in charge.

The Pacific Coast

SAN FRANCISCO, FEB. 28.

The American Aluminum-Metal Products Co., Burbank, Cal., has awarded a contract to R. W. McCrea, Huntington Park, Cal., for its new local plant, estimated to cost close to \$100,000. Richard D. King, 519 Van Nuys Building, Los Angeles, is architect.

A vocational building will be erected by the Board of Education, San Diego, Cal., in connection with its group of high school buildings at Balboa Park, estimated to cost about \$300,000. Theodore C. Kistner, San Diego, is architect.

The Western States Gas & Electric Co., Elks Building, Stockton, Cal., has plans under way for a new hydro-electric generating plant near Placerville, Cal., to comprise two units, each with capacity of about 10,000 kw. Other

units will be constructed later. With transmission system it is estimated to cost in excess of \$1,500,000.

The Ulrich Tubing Drainer Co., Huntington Beach, Cal., manufacturer of oil drainers and other metal specialties, will build a new factory, 48 x 60 ft. Frank Ulrich is head.

The Westinghouse Electric & Mfg. Co., Los Angeles, is completing plans for its new five-story plant at Fifth and San Pedro streets, estimated to cost about \$500,000, including equipment. Noerenberg & Johnson, Los Angeles, are architects.

The Board of Directors, Southern California Edison Co., Los Angeles, has authorized an appropriation of \$22,500,000, to be used during the year for extensions and improvements, including new power plants and equipment, transmission systems, substations, etc.

The Carmichael Irrigation District, Fair Oaks, Cal., has rejected all bids for electrically-operated pumping machinery for its irrigation works, and will call for new bids at an early date.

The General Electric Co., Schenectady, N. Y., with San Francisco offices in the Rialto Building, has acquired about 24 acres at Oakland, Cal., as a site for a new plant, to cost about \$1,000,000. It will be operated in conjunction with the lamp manufacturing plant at West Oakland.

The Thurston & Flavell Co., Port Moody, Wash., will build a power house and install motors and other electrical equipment in the different departments of its lumber mill. The work will cost about \$60,000.

The Tacoma Ice & Refrigerating Co., Tacoma, Wash., is perfecting plans for a new ice-manufacturing and cold storage plant at Holgate and South Twenty-sixth streets, estimated to cost \$250,000.

The Monroe Shingle Co., Betzen, Ore., is planning to immediately rebuild its shingle mill, destroyed by fire late last year, with loss in excess of \$75,000. A power plant will be constructed and the entire plant electrified, with all machinery operated by individual motor drive. It is estimated to cost about \$100,000.

The City Council, Leavenworth, Wash., has preliminary plans under consideration for a municipal electric power plant.

The Central South

ST. LOUIS, March 6.

The Pennsylvania Tank Line, 25 West Forty-third Street, New York, has awarded a contract to the Kansas City Structural Steel Co., Kansas City, Mo., for new railroad tank car works at Argentine, Kan., consisting of a steel fabricating shop, 80 x 100 ft.; machine shop, 40 x 45 ft., and forge and blacksmith shop, 80 x 100 ft., all one story.

The Kansas City Cold Storage & Warehouse Co., Kansas City, Mo., recently organized, has filed plans for its ice-manufacturing and cold storage plant, estimated to cost \$1,300,000, including machinery. It is a subsidiary of the United States Cold Storage Co., West Thirty-ninth Street and Hoyne Avenue, Chicago. S. Scott Joy, 2001 West Thirty-ninth Street, Chicago, is architect and engineer.

The Automatic Water Pump Mfg. Co., 236 East High Street, Jefferson City, Mo., recently organized with a capital of \$2,000,000 to manufacture automatic pumping machinery and parts, has plans under way for seven buildings, including general iron working department, foundry, machine shop, wood-working department, power house and other structures. The plant will approximate 260,000 sq. ft. of space, and will cost about \$150,000. A list of machine tools and other equipment to be installed is being prepared; bids both for buildings and equipment will be asked in from four to six weeks. Benjamin F. Schuetz is president.

The St. Louis & San Francisco Railroad Co., St. Louis, is arranging its shops at Fort Scott, Kan., to manufacture steel bodies for coal cars used on the system, and will increase the facilities and working force. A portion of the fund of \$435,000, arranged for new equipment during the present year, will be used at the plant. Another appropriation has been made of \$360,000, for rebuilding steel coal cars, including new bodies. For new power plants to be constructed during the year, a fund of \$205,000, has been set aside.

The Graft-Bright Mfg. Co., 441 East Jefferson Street, Louisville, recently organized, will operate a plant for the manufacture of agricultural implements. It is proposed to develop a daily output of 3000 garden hoes, rakes, spades, etc.

A four-story automobile service and repair plant, 130 x 160 ft., for company motor trucks and cars, estimated to cost \$350,000, will be built by the Scruggs, Vandervoort & Barney Dry Goods Co., Tenth and Olive streets, St. Louis. Plans have been prepared. M. L. Wilkinson is president.

The Riverside Light, Power & Gas Co., Abilene, Kan.,

will build a new hydroelectric power plant on local site, estimated to cost in excess of \$100,000. E. P. Callahan is superintendent.

The Pidgeon-Thomas Iron Co., Memphis, Tenn., has had plans prepared for a new steel fabricating shop, one story, 160 x 260 ft. to cost about \$75,000. Work will commence at an early date. E. L. Harrison, Memphis, is architect and engineer.

The Sinclair Refining Co., Coffeyville, Kan., will proceed at once with the erection of its new refinery, work upon which has been suspended for some time. The company will expend about \$3,000,000 on the refinery and other work in this district during the present year. Headquarters are at 111 West Washington Street, Chicago.

The City Commissioners, Parsons, Kan., will take bids up to March 28, for pumping machinery, electrical equipment, etc., for the waterworks system, including a 3,000-gal., crank and fly-wheel opposed type pumping engine; 1000 and 1800-gal. motor-driven centrifugal pumps and electrical equipment for the Neosho River pumping station; 1400 and 2100-gal. motor driven centrifugal pumps; two 180 k.v.a. engine-driven generators; two 150-hp. water tube boilers, with accessories and electrical equipment. F. W. Frye is city clerk. Burns & McDonnell, 402 Interstate Building, Kansas City, Mo., are consulting engineers.

The Profit-Sharing Ice Co., 315 James Building, Chattanooga, Tenn., will build a new one-story ice-manufacturing plant, 60 x 100 ft. Bowdre Brown is president.

The Great Eastern Refining Co., Leach, near Catlettsburg, Ky., recently organized with a capital of \$2,000,000, has acquired a site for the construction of a new oil refinery with daily capacity of about 1000 bbl., to cost approximately \$250,000. The output will be doubled in the near future. A large steel tankage department will also be erected. T. H. Gilman is general manager in charge.

The Common Council, Germantown, Tenn., is arranging for the construction of a municipal electric power plant.

The Greenback Brick Co., Greenback, Tenn., is perfecting plans for new works for the manufacture of brick, tile and kindred products, with an initial daily output of about 30,000 bricks. J. L. Jones is proprietor and manager.

The City Council, Nashville, Tenn., is planning to rebuild its municipal electric power plant, recently destroyed by fire with loss of about \$100,000. W. Southgate is city engineer.

The Stafford Motor Works, Twenty-second and Campbell streets, Kansas City, Mo., has awarded a contract to Harvey Stiver, 402 Shubert Building, for a one and two-story machine shop, 65 x 130 ft., to cost about \$30,000. R. A. Curtis, 637 Lee Building, is architect.

The Gulf States

BIRMINGHAM, March 6.

The Collinsville Mfg. Co., Fort Worth, Tex., manufacturer of metal products, has leased the building at 2810 Main Street, Dallas, Tex., for the establishment of a new plant and will remove its present works to the new location. S. A. Menczer is president; J. P. S. Morgan will be manager of the Dallas plant.

The Voth Hardwood Co., Voth, Tex., recently formed with a capital of \$150,000, has acquired the local property of the Keith Lumber Co., and plans a number of additions. An additional band saw mill will be constructed, with machinery to increase the output to 150,000 ft. per day. Lumber handling machinery and conveying equipment will be installed. B. F. Bonner is president, and Carroll Keith, secretary and general manager.

George W. Polk and T. B. Lyster, receivers for the Texas Motor Car Association, Fort Worth, Tex., are arranging for the sale of the company's property, including plant for the manufacture of automobiles and motor trucks, bodies, etc., with machine shop, forge shop, assembly shop, etc.

The Frigid Mfg. Co., 115 Parker Street, Tampa, Fla., recently organized with a capital of \$200,000 to manufacture ice and refrigerating machinery, has acquired a building, 50 x 225 ft., for its plant and will commence the installation of machinery at once. A. N. Duncan is president and treasurer.

The Florida Filter Corporation, 219 West Bay Street, Jacksonville, Fla., lately organized, has acquired a building for the manufacture of water filter equipment. Initial operations will be devoted for the most part to assembling, and equipment will be installed to provide for a capacity of 500 filters a month. The production of parts will be arranged for at outside plants. W. E. Dunbar is general manager.

The Hialeah Producing & Refining Co., 25 Second Avenue, Miami, Fla., E. D. Noe, president, is planning for a

new oil refinery at Hialeah with initial daily capacity of about 1000 bbl. It is estimated to cost about \$200,000.

Fire, Feb. 25, destroyed the machine shop, forge and blacksmith shop, boiler shop and other buildings at the plant of the Gulf & Ship Island Railroad Co., Gulfport, Miss., with loss estimated at about \$75,000.

The Russell Clay Mfg. Co., Equitable Building, Baltimore, Floyd B. Powell, manager, has acquired a plant at Alton, near Birmingham, and will establish works for the manufacture of vitrified paving brick, with initial daily output of about 50,000 brick. Equipment will be installed at once, including about 200 industrial cars.

The Vitrolite Co., 133 West Washington Street, Chicago, with factory at Parkersburg, W. Va., has leased property at 3220 Commerce Street, Dallas, Tex., for a branch plant. Machinery will be installed for cutting, grinding, polishing and finishing the crude vitrolite material from the Parkersburg works.

H. B. Stevens, Naples, Morris County, Tex., has work under way on a new building for an electric power and ice-manufacturing plant for service in this section. It will cost about \$65,000.

The O. K. Battery Co., Dallas, Tex., has leased the building at 2815-17 Main Street, for the establishment of a plant to manufacture electric storage batteries and parts. It is proposed to develop an output of 4,000 batteries a month. C. G. Lippencott is president.

The Valley Ice Co., 1121 Julia Street, New Orleans, La., W. H. McGraw, head, is arranging for the erection of a one-story ice-manufacturing plant with daily capacity of about 100 tons, estimated to cost \$40,000.

The new engineering shop building to be erected by the board of directors, Agricultural and Mechanical College of Texas, College Station, Tex., will comprise machine shops, forge shop, foundry, carpentry, pattern and other mechanical departments, estimated to cost about \$175,000, of which about \$40,000 will be expended for equipment. A list of machinery will be arranged at an early date. A new agricultural building will also be built, to cost \$250,000. The Wattinger Construction Co., Austin, Tex., has the general building contract.

W. E. Hart and Herbert Graves, Fort Worth, Tex., have organized a company with capital of \$200,000 to build a plant to manufacture hand-power laundry and washing machines. Work will commence at an early date. The Industrial Bureau of the Chamber of Commerce, Roscoe Adv. director, is interested in the project. Mr. Hart will be president of the organization.

A vocational department will be installed in the new high school to be erected at Sulphur Springs, Tex., by the local School Board, E. L. Ashcroft, president. Plans have been prepared by Barlebaugh & Whitson, Dallas, Tex., architects.

The Frost-Johnson Lumber Co., Shreveport, La., will consolidate with H. W. Cole, Pine Bluff, Ark., operating a large hardwood mill. The merged company will operate under the Frost-Johnson name, and has plans under way for a new hardwood flooring plant at Shreveport to cost \$300,000, including equipment. The Pine Bluff plant will be continued as a branch. E. A. Frost is president.

Canada

TORONTO, MARCH 6.

The machine-tool business continues on about the same level as that of the past few weeks. Orders are being received in limited numbers for one or two machines with an occasional order for larger quantities, but big lists are absent. Inquiries are increasing, with many considered as good prospects, and it is the general opinion that business is showing slow but steady improvement. The outlook for March is much brighter than either of the two previous months. Salesmen are following up every prospect and in some cases are resorting to price shading when a good order is in view. The demand for drills, taps, reamers, etc., continues steady, with inquiries and a few orders being received for future use. While some shading is being done by dealers no general price revision has been made, although there is a possibility that some reductions may be announced later.

The Standard Steel Construction Co., Welland, Ont., is in the market for a second-hand locomotive crane from 7½ to 10 tons capacity.

It is reported that the plant of the Messervy Battery Co., Brampton, Ont., has been purchased by the Arbol Mfg. Co., New York, and that it will be enlarged and additional equipment installed.

The Thornton Rubber Co., Oshawa, Ont., suffered loss by

fire Feb. 22, amounting to \$100,000, including building, machinery, etc.

The Canadian National Railways have acquired a large tract of land on the outskirts of Regina, Sask., and will use it for yard extensions, increased grain handling facilities and for the enlargement of its shops.

There is no possibility at present of a plant being established in Toronto by the Canadian Car & Foundry Co., Montreal, stated W. W. Butler, president of the company, when referring to the report that has been circulated recently that such a move was contemplated.

It is reported that the International Harvester Co., Hamilton, Ont., is negotiating for the purchase of the plant of La Machine Agricole de Montmagny, Montmagny, Que.

Announcement was made by the Chamber of Commerce, St. Thomas, Ont., that the Wood-Gorrie Motors, Ltd., a newly incorporated company, formed for the manufacture of the Warwick light six car in four models, has selected St. Thomas, Ont., for the location of its plant. It has engaged temporary quarters in the factory of St. Thomas Boxes, Ltd., which will be used as an assembling plant. Negotiations are underway for the purchase of a 25-acre site, in the new industrial area. W. B. Wood, Toronto, is president of the company; A. J. Gorrie, Montreal, vice-president; C. R. Collard, Toronto, secretary-treasurer, and W. H. Smith, Toronto, chief engineer and designer. At the outset the company will be an assembling concern only, using standard automobile parts.

The preliminary work for the construction of the plant for the Three Rivers Pulp & Paper Co., Three Rivers, Que., which is capitalized at \$3,000,000 will start this month, and it is expected that the plant will be in operation by the end of 1923.

A manufacturing plant will be constructed at Galt, Ont., by the International Tank & Silo Co., Ltd. It has purchased a 4-acre site on which will be erected a one-story factory, 120 x 200 ft. The company will turn out the same products as those manufactured by the Endlock Mfg. Co., Des Moines, Iowa.

Trade Changes

Noel Cunningham, formerly connected with the Coal Washing Equipment Co., has now become associated with the Hardinge Co., Incorporated, 120 Broadway, New York. This change is due to the acquirement by the Hardinge Co. of all manufacturing and sales rights of the James coal washing equipment, formerly handled by the Coal Washing Equipment Co. This machinery is used for the reduction of the ash and sulphur content of all sizes of anthracite and bituminous coals. Mr. Cunningham has been placed in charge of this new department of the Hardinge Co.

The Stowell Co., founder and manufacturer, South Milwaukee, Wis., has changed the location of its Chicago Office from 509 Monadnock Block to 620 McCormick Building. E. B. Hansen will continue as manager of the office.

The American Machine & Foundry Co. has acquired a substantial interest in the Gurney Elevator Co. and it is understood that hereafter Gurney elevators will be manufactured in the plant of the American Machine & Foundry Co. in Brooklyn, in addition to the Gurney Elevator Co.'s plant at Honesdale, Pa. This arrangement was brought about to provide increased manufacturing facilities for the rapidly growing business of the Gurney Elevator Co., partly due to its entrance into the field of high-speed gearless elevators.

The name of the American Sheet Metal Stamping Corporation has been changed to the Henson-Blair Mfg. Co., effective March 1.

The Whiting Corporation, Harvey, Ill., foundry equipment, has established a branch sales office in New York at 136 Liberty St., having discontinued its agency agreement with Wonham, Bates & Goode Trading Corporation, N. Y. J. Ross Bates, now a vice-president of Whiting Corporation, is in charge of the new office. He will be assisted in the New York territory by D. Polderman, Jr. and in the New England States by R. C. Maley, who will open an office at Springfield, Mass. All of these gentlemen were formerly associated with Wonham, Bates & Goode Trading Corporation. The Whiting Corporation has also opened a branch office in Indianapolis, 305 Merchants Bank Bldg., in charge of S. E. Stout, formerly at the main office, Harvey Ill. Mr. Stout will cover southern Indiana and adjoining cities in Ohio and Kentucky. The company's Detroit Office has been moved from Penobscot Building to 206 Stahelin Bldg., 3000 Grand River Ave.

The business of William Wieman & Co. dealer in pig iron, steel, coal and coke, and that of C. S. B. Ward & Co., Inc., dealer in coal and coke, have been merged and will be continued under the name of The Wieman & Ward Co., with offices at 997-998 Union Arcade Building, Pittsburgh. William Wieman is president and treasurer and C. S. B. Ward, vice-president and secretary.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The following quotations are made by New York City warehouses.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-ferrous Metals."

Iron and Soft Steel Bars and Shapes

Bars:	Per Lb.
Refined bars, base price.....	2.53c.
Swedish bars, base price.....	10.00c.
Soft steel bars, base price.....	2.53c.
Hoops, base price	3.38c.
Bands, base price	3.13c.
Beams and channels, angles and tees	
3 in. x ¼ in. and larger, base.....	2.63c.
Channels, angles and tees under 3 in. x ¼ in., base	2.53c.

Merchant Steel

	Per Lb.
Tire, 1½ x ½ in. and larger.....	2.50c.
(Smooth finish, 1 to 2½ x ¼ in. and larger) ..	2.70c.
Toe-calk, ½ x ¾ in. and larger	3.20c.
Cold-rolled strip, soft and quarter hard..	6.25c. to 7.25c.
Open-hearth spring steel	3.55c. to 6c.
Shafting and Screw Stock:	
Rounds	3.35c.
Squares, flats and hex	3.85c.
Standard cast steel, base price	12.00c.
Extra cast steel	17.00c.
Special cast steel	22.00c.

Tank Plates—Steel

¾ in. and heavier.....	2.63c.
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Sheets

Blue Annealed

	Per Lb.
No. 10	3.28c. to 3.53c.
No. 12	3.33c. to 3.58c.
No. 14	3.38c. to 3.63c.
No. 16	3.48c. to 3.73c.

Box Annealed—Black

	Soft Steel C. R., One Pass Per Lb.	Blued Stove Pipe Sheet, Per Lb.
Nos. 18 to 20	3.55c. to 3.80c.	.....
Nos. 22 and 24	3.60c. to 3.85c.	4.10c.
No. 26	3.65c. to 3.90c.	4.15c.
No. 28	3.75c. to 4.00c.	4.25c.
No. 30	4.00c. to 4.25c.	.....

No. 28 and lighter, 36 in. wide, 10c. higher.

Galvanized

	Per Lb.
No. 14	3.85c. to 4.10c.
No. 16	4.00c. to 4.25c.
Nos. 18 and 20	4.15c. to 4.40c.
Nos. 22 and 24	4.30c. to 4.55c.
No. 26	4.45c. to 4.70c.
No. 27	4.60c. to 4.85c.
No. 28	4.75c. to 5.00c.
No. 30	5.25c. to 5.50c.

No. 28 and lighter, 36 in. wide, 20c. higher.

Welded Pipe

Standard Steel

	Black	Galv.		Black	Galv.
½ in. Butt...	—56	—40	¾ in. Butt...	—30	—13
¾ in. Butt...	—61	—47	1½ in. Butt...	—32	—15
1-3 in. Butt...	—63	—49	2 in. Lap....	—27	—10
3½-6 in. Lap.	—60	—46	2½-6 in. Lap.	—30	—15
7-8 in. Lap...	—56	—34	7-12 in. Lap..	—23	—7
9-12 in. Lap..	—55	—33			

Steel Wire

BASED PRICE* ON NO. 9 GAGE AND COARSER Per Lb.

Bright basic	3.50c. to 3.75c.
Annealed soft	3.50c. to 3.75c.
Galvanized annealed	4.25c. to 4.50c.
Coppered basic	4.00c. to 4.25c.
Tinned soft Bessemer	5.50c. to 5.75c.

*Regular extras for lighter gage.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	16¼c. to 17 c.
High brass wire	17 c. to 17¼c.
Brass rod	14¼c. to 14½c.
Brass tube, brazed	26 c. to 27½c.
Brass tube, seamless	18½c. to 19 c.
Copper tube, seamless	20¼c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 20¼c. to 21c. per lb. base.
Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.

Tin Plates

Bright Tin	Grade "AAA" Charcoal 14x20	Grade "A" Charcoal 14x20	Coke—14-20	Primes Wasters
	IC..\$10.00	\$8.50	80 lb..\$6.05	\$5.80
	IX.. 11.50	10.00	90 lb.. 6.15	5.90
	IXX.. 13.00	11.25	100 lb.. 6.25	6.00
	IXXX.. 14.25	12.50	IC.. 6.40	6.15
	IXXXX.. 16.00	14.00	IX.. 7.40	7.15
			IXX.. 8.40	8.15
			IXXX.. 9.40	9.15
			IXXXX.. 10.40	10.15

Terne Plates

8-lb. Coating 14 x 20

100 lb.	\$7.00
IC	7.25
IX	7.50
Fire door stock	10.00

Tin

Straits, pig	32c.
Bar	37c. to 42c.

Copper

Lake ingot	15 c.
Electrolytic	14¼c.
Casting	14½c.

Spelter and Sheet Zinc

Western spelter	6½c. to 7c.
Sheet zinc, No. 9 base, casks	10½c. open 11c.

Lead and Solder*

American pig lead	5¼c. to 6¼c.
Bar lead	6¼c. to 7 c.
Solder, ½ and ½ guaranteed	24c.
No. 1 solder	22c.
Refined solder	18c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.	75c.
Commercial grade, per lb.	35c.
Grade D, per lb.	25c.

Antimony

Asiatic	5¼c. to 6c.
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Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb....	25c. to 27c.
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Old Metals

Business has been very quiet during the week and values are generally stationary. Dealers' buying prices are nominally as follows:

	Cents Per Lb.
Copper, heavy crucible	10.50
Copper, heavy wire	9.75
Copper, light and bottoms	8.00
Brass, heavy	5.00
Brass, light	4.50
Heavy machine composition	7.25
No. 1 yellow brass turnings	5.00
No. 1 red brass or composition turnings	6.75
Lead, heavy	3.75
Lead, tea	2.50
Zinc	2.50

